the OIL AND GAS JOURNAL

PUBLISHED WEEKLY JULY 10, 1961

OFFSHORE DRILLING

Today and beyond - U. S. and abroad

p. 88

LPG men are in for a rough summer ▸ 62

Geophysical work down again ▸ 68

How Canada's oil policy is working ▸ 70

Calney batches over high places ▸ 117

Making the most of electrical logs ▸ 162

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OIL AND GAS JOURNAL
Vol. 59, No. 28

Contents July 10, 1961

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SPECIAL OFFSHORE SECTION

What's Needed Offshore 88

By Alden J. Laborde

The president of Ocean Drilling & Exploration makes these two points: (1) Offshore operators should plan their wells months in advance, and (2) a doubled allowable at a double spacing should be made to provide greater incentive for offshore drilling.

Platform "Hilda" is a Versatile Performer 90

Unit, designed for 175 ft. of water, is now drilling in 106 ft. and has potential for 350-ft. drilling. Platform which can drill 24 wells on one location, can be expanded to 36 under certain conditions.

Multirig Platforms Save for Calco 93

By Ed McGhee

Four rigs can't operate as cheaply as one, but four rigs on one platform are cheaper than one rig on each of four different platforms. Unit operating cost is kept low by running two drilling rigs and two completion rigs on one platform from one tender.

Fire Protection for Offshore Electric Generators 95

Spliced Concrete Piles for Offshore Construction 96

By Ed McGhee

The combination of shallow offshore water and long concrete piles presented construction problems for Shell Oil in erecting a platform. Since shallow-water derrick barges couldn't handle the piling in a single piece, piles were made in two sections and then spliced together on the job.

World-Wide Offshore Drillers Optimistic 98

By Paul Swain

Big-time oil is the payoff for some of the drillers in the Persian Gulf and the Gulf of Paria. Disappointment is the lot of others. This report spots the significant finds and failures in these waters and such other areas as the Sea of Japan.

Project Mohole: Full of Promise for Oil 108

By Ed McGhee

A free gift of research and development is the oil industry's likely harvest from scientists' attempts to drill Mohole. Practice holes recently completed were resoundingly successful.

Underwater Storage Unit Cuts Offshore Operating Costs 114

The California Co. has started operations with its new 20,000-bbl. submersible storage facility. Big advantage is the salvability of the unit. It can be moved to a new location without much loss in time for rigging up.

TECHNOLOGY—OPERATION

Calnev Pipeline Moves Batches Over High Places 117

By J. B. Harshman

Products line climbs more than 3,700 ft. and requires substantial back pressure to keep line full and avoid commingling of products.

Activated Carbon Process Recovers Hydrocarbons 120

By H. C. Bozeman

Processing Notes 124

New wax plant is a slick performer—New units triple Cosden's styrene production capacity—American Oil will build new crude unit.

How to Evaluate Precontract Engineering 128

By John J. Schottinger

Experience shows the designs and budgets produced in this early engineering frequently are a guide for the entire project, making precontract engineering one of the most important engineering phases of the construction.

French Petrochemical Industry is Mushrooming 133

By Maurice Moulin

Catalytic cracking, catalytic reforming, and steam-cracking plants provide the basic hydrocarbons being used by French refiners and the French chemical industry to make petrochemicals. Annual sales now exceed 1,200 million francs.

Oil-Well Pumping—47 137

By Joseph Zaba

Subsurface hydraulic pumping.

The Foreman's Page 141

THE OIL AND GAS JOURNAL **Newsletter**

July 10, 1961

Significant this week

The oil news in midsummer is dominated by new pressure on crude prices, a glut of LPG, changes in the FPC, and strikes.

The pressure on U. S. crude prices is coming from a strange source—the Canadian dollar.

The recent 6-cent decline in Canadian currency has made oil from that country 15 to 20 cents a barrel cheaper to U. S. refiners than it was a year ago. This hurts American crude competing in an increasing number of markets in the North Central and Great Lakes states.

Refiners say the disparity cannot continue. One of two things is bound to happen: Canadians will adjust their prices upward or U. S. producers will have to cut.

Other interesting possibilities are a dual pricing system in Canada with domestic prices unchanged but exports higher or a tariff increase on Canadian oil (p. 79).

LPG producers already wish the summer were over and it was suddenly October.

This is their problem: Inventories are at a record high, for this time of year, nearly as high as they were at the start of the 1960-61 heating season. Production also strangely has not made its customary summer turndown.

The trouble has been reflected in two price breaks which have dropped prices by 2 to 2.5 cents, with spots down even more.

Overproduction is complicated by new plants coming on stream, heavy flow of natural gas to be processed, and shifts in the chemical industry (p. 62).

Geophysical activity in the free world again is showing the depressing effects of world oil oversupply.

Activity is down 8.3%, the fourth straight year this segment of the oil industry has shown a decline.

The total of 10,526 crew months for 1960 is 22.8% below the 1956 peak year (p. 68).

But there's one bright spot in exploration—the offshore areas—and the outlook grows brighter there.

Some reasons for optimism: Most offshore drilling firms are showing a profit; production in domestic waters is rising, and there's plenty of hope for discovery of big new fields in the new seaward regions (p. 59).

Significant developments in equipment and drilling methods offshore are covered in a special section starting on p. 88.

Now that FPC is controlled by Kennedy appointees, look for the new members to have considerable impact on the shape of gas regulation.

Any changes may still be a while in developing, but best bet is for a compromise approach to the present muddle.

This means that complete decontrol of producers is out of the question. But it also means that efforts to regulate producers on utility-type cost-of-service basis will be dropped.

You can be sure the White House will insist on two things: Some built-in protection of consumer prices to satisfy liberal element in Congress and restriction on industrial sales to pacify the coal interests (p. 82).

Natural-gas producers, meanwhile, are telling the FPC in no uncertain terms they don't like two new rules proposed by the commission.

The rules would affect rate of take and establish a set quality standard for gas. Most producers feel the proposals are a further tendency by FPC to dictate every term of contracts.

Fire centers around the change which would downgrade gas sold to a pipeline not measuring up to prescribed standards. Producers object that no provision is made for gas exceeding the standard, that there's danger of double penalties on some gas, and the rule would upset many contracts (p. 66).

An interesting report on how Canada's new oil policy is working has been made by key officials of Imperial Oil Ltd., Canada's leading oil firm.

These officials in an exclusive interview say that:

...Production goals are being met.

...Exports, contrary to beliefs of U. S. operators, have not jumped unfairly and Canadians are not seeking to raid U. S. markets, especially Buffalo.

...Internal shifts are being made to increase consumption of Canadian crude in the Ontario market (p. 70).

Cost of operating U. S. flag tankers will be up sharply over the next 4 years.

Agreement reached by tanker operators and National Maritime Union, which likely will be a pattern, calls for a 10.75% wage increase and a 11% increase in fringe benefits to be spread over the 4-year period. Wages are half a tanker's daily costs (p. 80).

Independent tanker owners are asking the Federal Trade

Commission to make major oil firms quit using their tankers to haul oil for each other.

Ship owners claim the majors are hauling at below-cost rates to drive independent tanker operators out of business and to regulate product prices on East Coast markets.

A new concept in pipelining—the self-supporting pipe arch—is now being used to carry gas over Coldwater Creek in north St. Louis County, Missouri.

Biggest advantage of this type crossing is the speed of installation. Crews erected the 150-ft. arch in 12 hours (p. 75).

Other pipeline news: Work is more than half finished on the Alberta to San Francisco 36-in. gas line, currently the biggest pipeline project in the industry (p. 64)...The giant new pipeline company formed by merging Humble Pipe Line Co. and Interstate Oil Pipe Line Co. will take the Humble name (p. 77).

News in the making

California's drive to get two auto afterburners approved this year will fall short of its goal. It will be sometime in 1962 before two devices are approved and 1966 before afterburners are required on all cars in the state. Delay is due to the time taken to develop testing procedures.

Mining and petroleum-engineering courses at University of North Dakota are on the way out.

Curriculum will be suspended as of September 1962.

President George Starcher says decline at his school—like enrollment drop in many others—probably can be traced to increasing interest in such "pure sciences" as physics.

Justice Department has told Honolulu Oil its proposed sale to Pan American and Tidewater raises some antitrust questions but has not spelled out the questions.

Honolulu officials plan a meeting with Justice to discuss the issues. Meanwhile, they postponed a stockholders meeting to consider the sale until July 28. Final legal work toward closing the deal is going ahead. Lack of a tax ruling on production payments delayed the meeting.

Borrowings in the U. S. by Canadian business and cities have fallen to their lowest level in years. This follows increase from 5 to 15% in the tax imposed on interest paid to foreigners the first of the year.

But neither this tax nor the one on dividends paid to U. S. parents by Canadian subsidiaries has prevented Canadian oil men from obtaining necessary capital.

Market memo

July 10, 1961

Product markets provide nothing to shout about, but at least they're steady.

Gulf Coast suppliers are watching Sinclair for a possible gasoline cargo purchase. They figure Sinclair will need gasoline to move to the East Coast when the shipping strike is ended because of the company's own strike-plagued operations. Sinclair's Houston plant is being operated by supervisors at about half capacity.

The Gulf gasoline market appears to be holding firm on the recent fourth of a cent advance to 11 cents for 92-octane.

River markets are described as "dead to quiet" with gasoline available at one fourth to one-half off the Gulf Coast low. Feelers are out for No. 1 and No. 2 but no deals made because the prices are not attractive to buyers.

In the Mid-Continent the normal one-fourth cent discount from posted 12.5 cents on gasoline is prevalent along the Great Lakes pipeline. A 12-cent price is being offered in the northern reaches of the area.

East Coast gasoline has a firm undertone except for the marathon Charlotte price war. Following a return to normalcy in New York and New England, markets improved in Delaware, Maryland, and the District of Columbia. The Charlotte war waxed hotter last week when Sun started selling its bottom grade at 17.9 cents a gallon retail compared to 19.9 cents for the regular grade of other majors.

Crude price changes: **Suntide** has cut postings by 5 to 10 cents a barrel along the Gulf Coast. Refugio light crude was cut from $3.25 to $3.20 on about 4,500 bbl. in Victoria County. Another 1,000 bbl. daily in Roche field of Refugio County was cut from $3.20 to $3.15, and 3,000 bbl. daily in Nueces and San Patricio counties was cut from $3.35 to $3.25 . . . **Imperial Oil Ltd.,** posted 2-cent per barrel raises on four fields in Alberta and 1 to 7-cent raises in several Saskatchewan fields.

Marketers are following with interest the **$75-million motor park project** in Mid-Ohio being planned by Cleveland investors along new Interstate Highway 71.

It will be a **pioneer in interregional travel centers** serving cross-country motorists. Matching facilities will be built on opposite sides of the highway. They will provide a variety of lodge accommodations, dining facilities, auto services and supplies, recreation, shopping, and convention space. **Other facilities:** Space for permanent exhibitions, shows, and demonstrations, a theater-chapel, sites for industries in the truck, bus, freight storage and private airplane fields.

Designers of Twin Parks are putting it in open country and claim it may set a pattern for the next 20 years. By then they expect a vast network of superhighways from coast to coast that will have a revolutionary impact on movement of people and goods.

Good Wells Make Good News

Gas Wells That Have Been Improved By Dowell Fracturing

July 10, 1961

In line with the increasing interest in gas wells as a major source of income, here is a report on four successful fracture treatments.

- **Dimmit County, South Texas** (New Gas Well) Perforations were into the Navarro-Escondido sand from 1204 to 1211 feet. The operator wanted a low-cost job and wanted to reduce swabbing to a minimum. Frac Acid treatment, using 5000 gallons gelled acid, 20 pounds Slick Water* friction-reducing agent and 3000 pounds 20-40 mesh sand, was performed by Dowell. Injection rate was 12 bpm down annulus. Potential was increased from 100 to 1000 mcfd.

- **Eddy County, New Mexico** (Old Gas Well) Production was 1000 mcfd from the Atoka sand through perforations from 9052 to 9069 feet. Dowell fractured using 8500 pounds sand followed by 450 pounds 12-20 walnut shells. Fracturing fluid was a mixture of refined oil and 36° API crude. Injection was down casing, 12.5 bpm at 4900 psi. Production increased to 6000 mcfd and 54 barrels of distillate through a 11/64th choke at 2900 psi flowing pressure.

- **Warren County, Pennsylvania** (Wildcat Gas Well) This was the first attempt to fracture the Medina sand in this area and at this depth (5943 feet). A core was sent to Dowell's Tulsa laboratory for testing. As a result, a Waterfrac treatment was designed using sand and aluminum pellets as propping agents. Abrasijet* abrasive jetting service was used to notch the casing before fracturing. Pay was fractured using 11,950 gallons gelled water, 12,000 pounds 20-40 mesh sand and 300 pounds 12-16 mesh aluminum pellets at an injection rate of 26 bpm. After treatment, well tested 975 mcfd.

- **Carson County, Texas Panhandle** (New Gas Well) This well was completed into the Dolomite through three sets of perforations between 2904 and 2948 feet. Other wells in this area, fractured with crude or refined oil, have tested 5000 mcfd maximum. Dowell used Waterfrac service to fracture this well as follows: 250-gallon spearhead of Silicate Control Acid, water flush, 10,000 gallons gelled water with 50,000 pounds sand, 250 gallons diverting agent, 250 gallons Silicate Control Acid, 10,000 gallons gelled water with 50,000 pounds sand. Well kicked off naturally and tested 18,000 mcfd.

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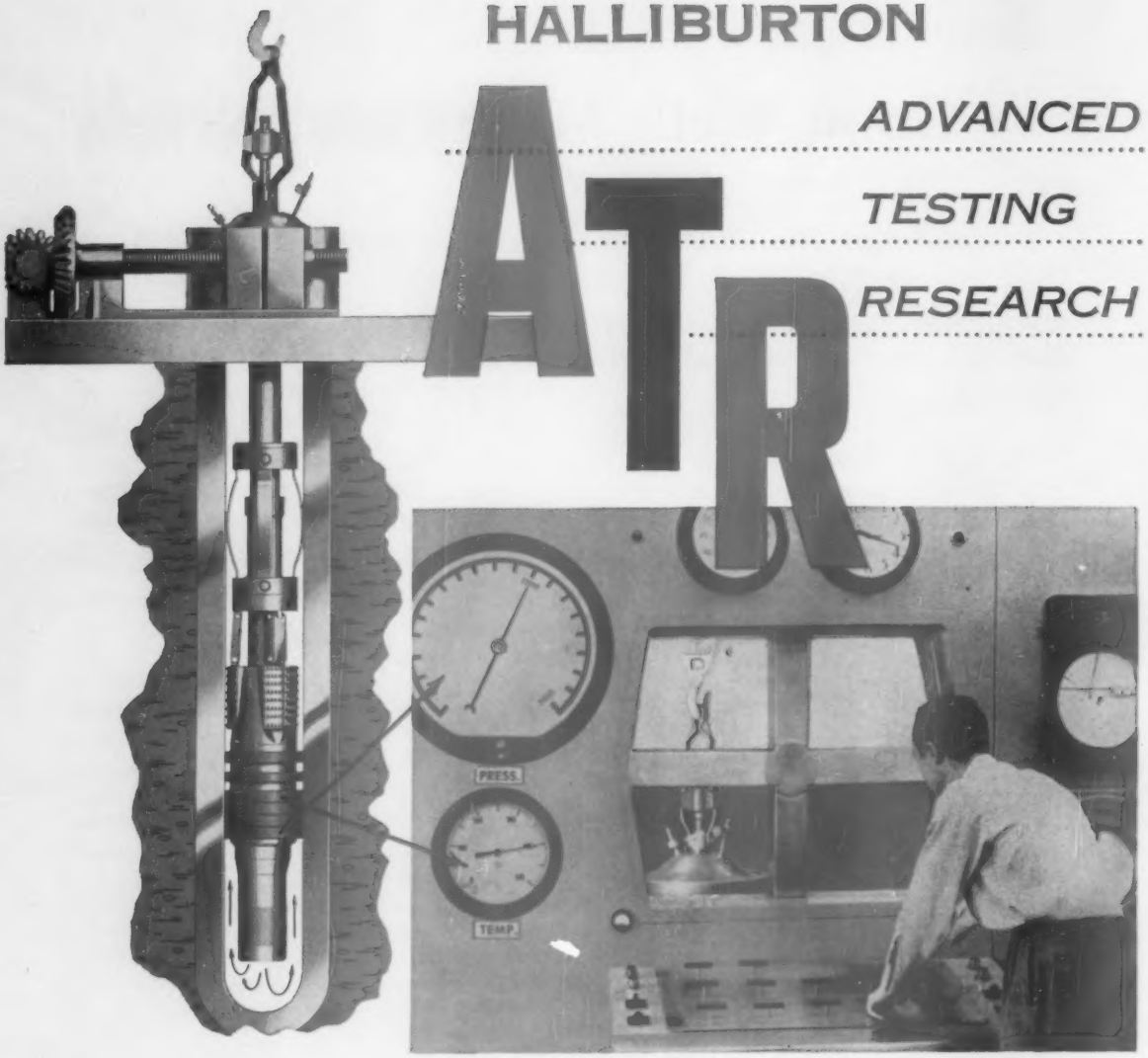

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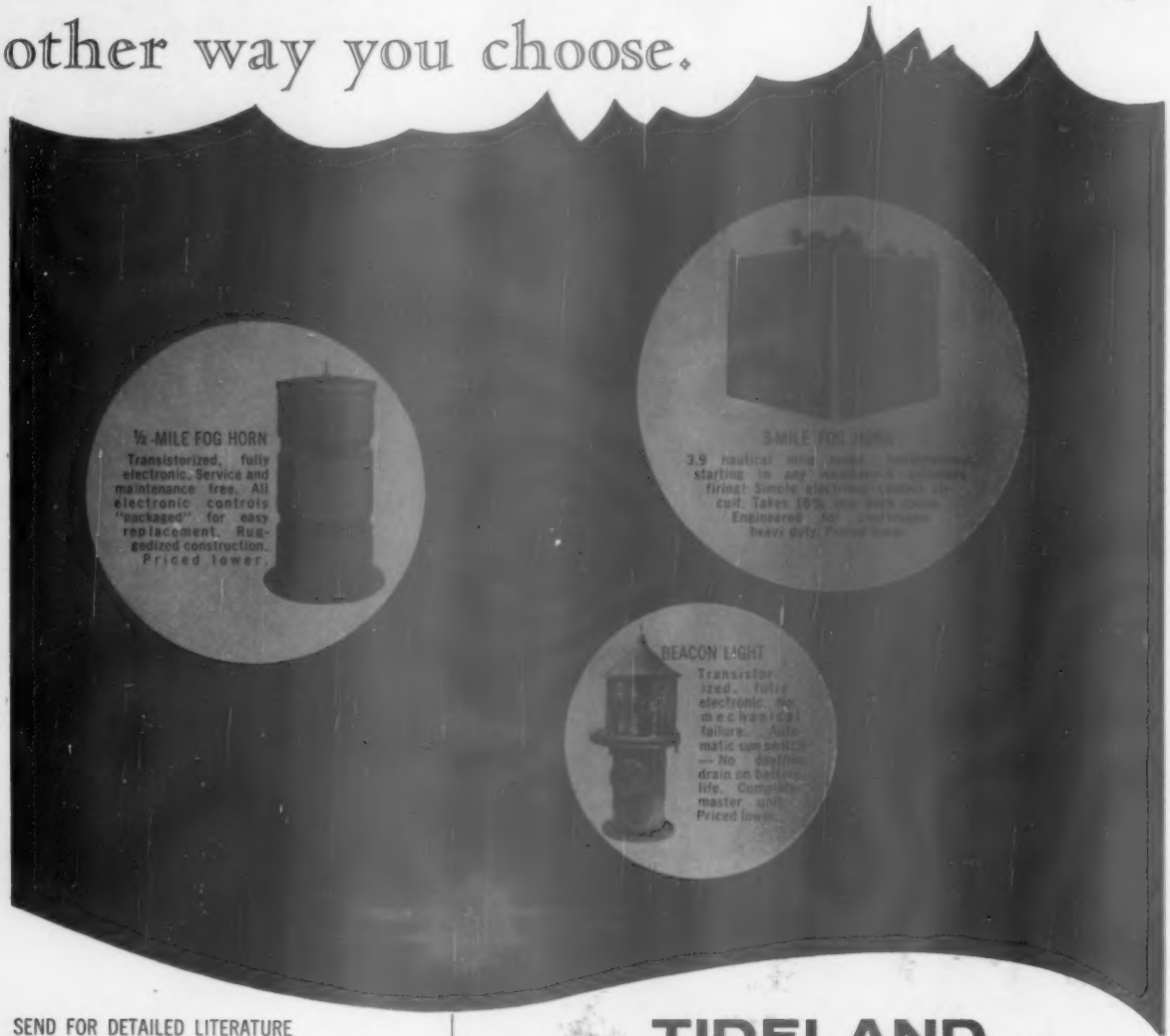
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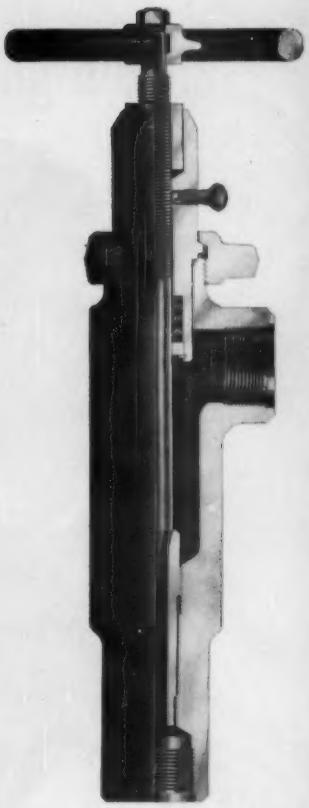

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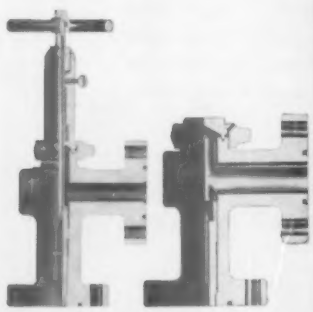

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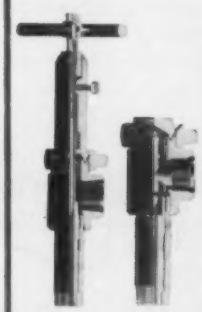
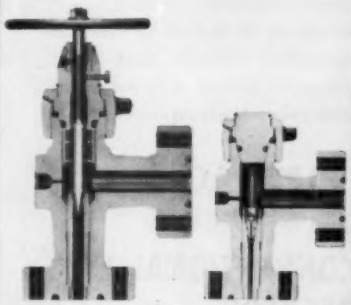


N-60 Adjustable Choke, FT-108 Positive Choke



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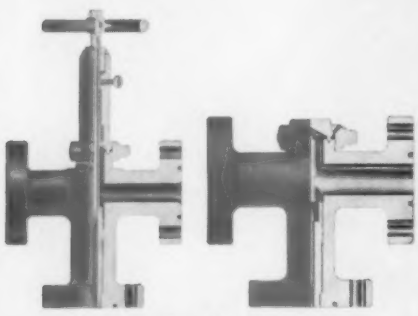

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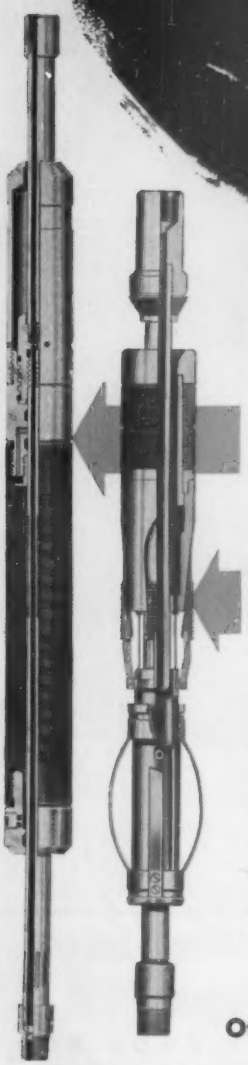

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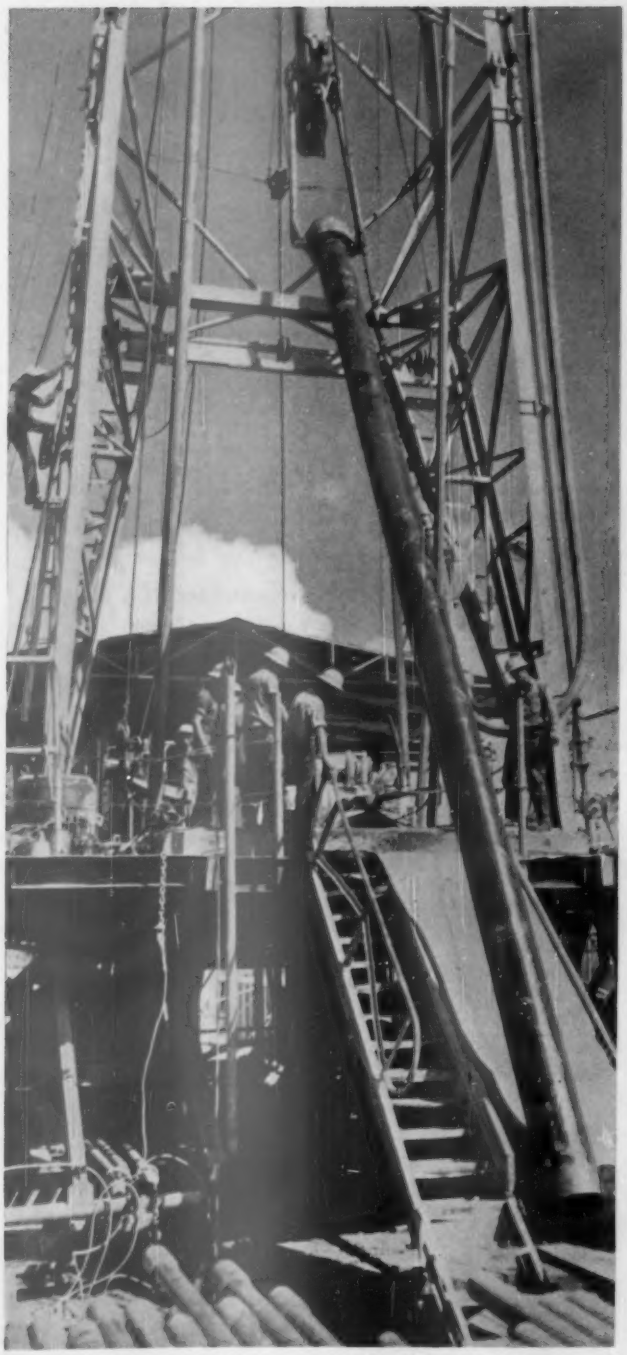

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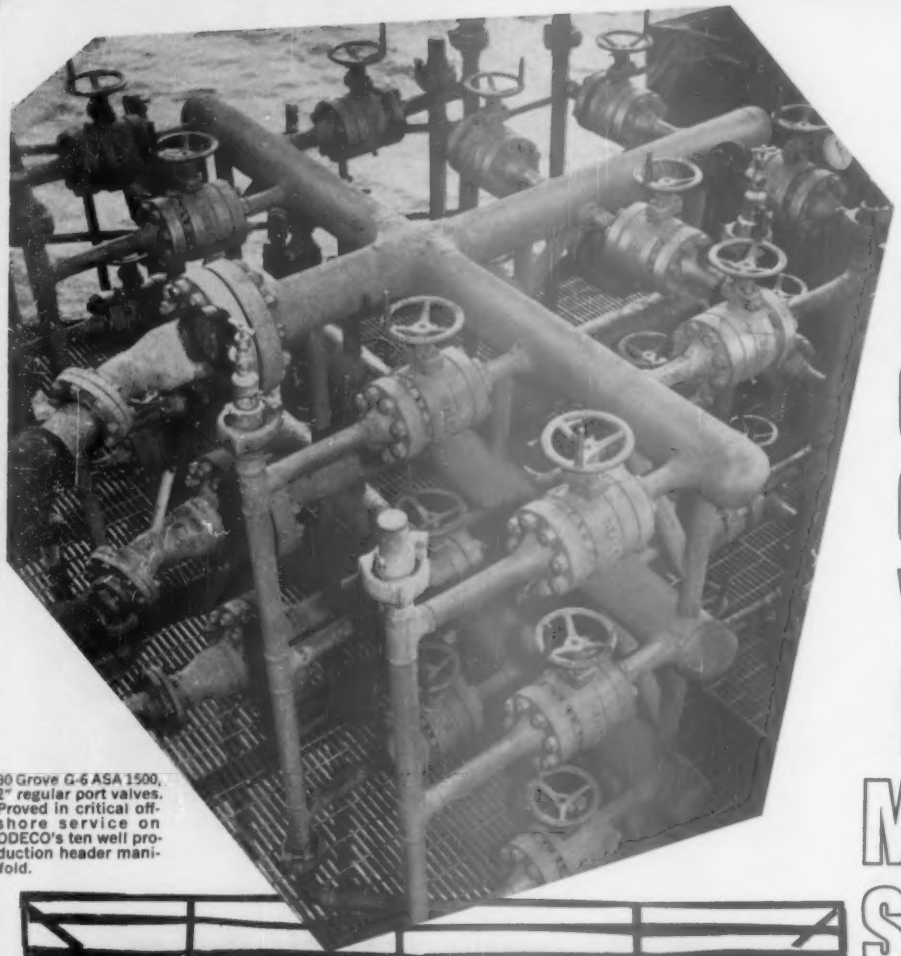
ARMCO Drainage & Metal Products



30 Grove G-6 ASA 1500, 2" regular port valves. Proved in critical offshore service on ODECO's ten well production header manifold.

FIRST COMPACT GATE VALVE FOR MANIFOLD SERVICE

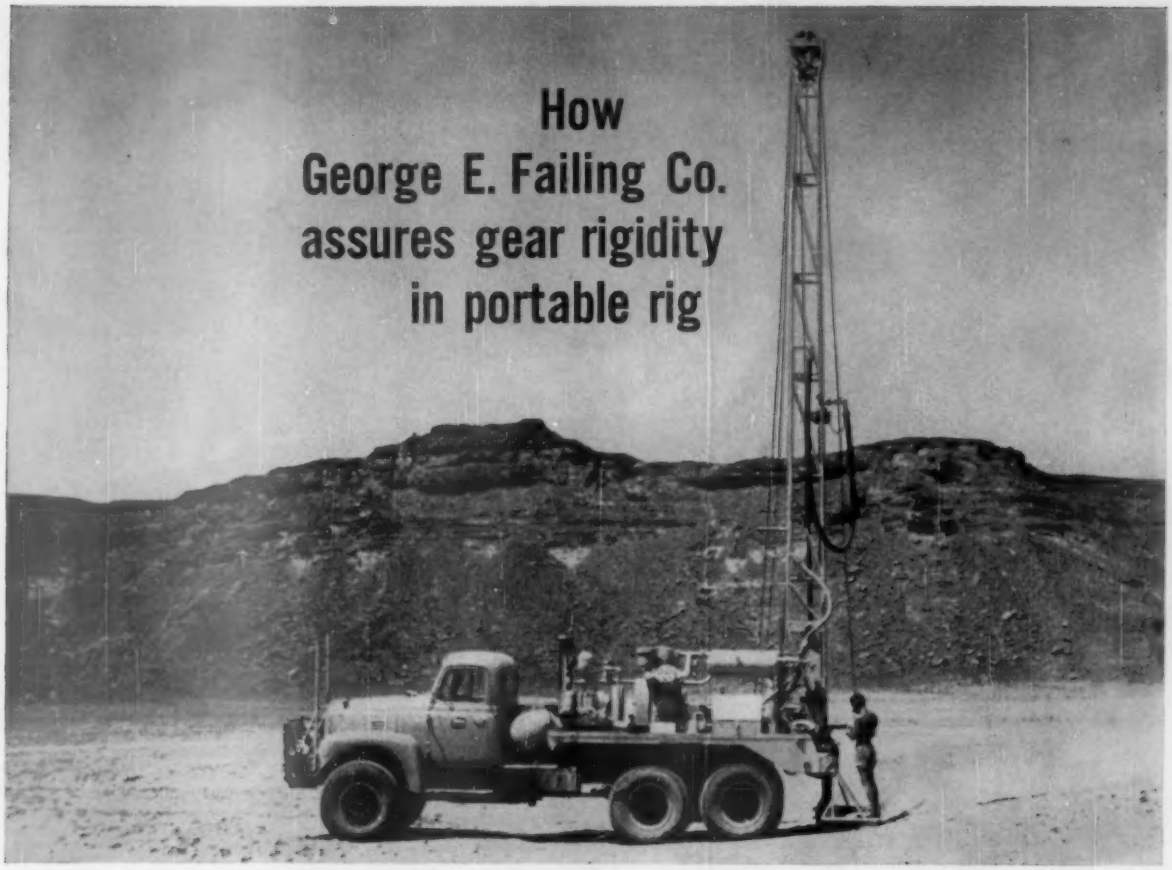
With Flow Characteristics Superior to Plug Valves.

Though reduced to a compact 14⅜" overall height, new Grove G-6 valves provide a round opening for ideal flow characteristics. G-6 Regular Port Valves feature field proved Grove Seal-"O"-Ring® system that provides a primary, positive metal-to-metal seal backed up by o-rings to assure bubble-tight closing. And because G-6 valves never need lubrication or sealing compounds, these maintenance costs are eliminated. Designed for flow lines, tubing and casing heads, wing valve and manifold services. 2" size in ASA 900, 1,500 and API 3,000#, 5,000# wog.

GROVE VALVES

GROVE VALVE AND REGULATOR COMPANY
a subsidiary of Walworth
6529 Hollis Street, Oakland 8, California
Offices throughout the U. S. and in Western Canada

How George E. Failing Co. assures gear rigidity in portable rig



To be sure of trouble-free performance for their CFD-1B Holemaster® portable rig, Failing's engineers wanted maximum rigidity for bevel gear drives in both the draw works and rotary table. To get it, they specified Timken® tapered roller bearings. And they also specified Timken bearings for the water swivel.

Timken bearings hold gears rigid because their full-line contact of rollers offer minimum deflection and their tapered design lets them take radial and thrust loads in any combination. They permit exact bearing setting to give optimum performance. What's more, the mounting of Timken bearings on the bevel gears permits accurate gear mesh setting with no disassembly of the drive.

ENGINEERING SERVICE that often solves bearing problems on the spot is the kind you get from our graduate engineer salesmen. They'll help you select the right and most economical Timken bearing for your products.

Industry rolls on

TIMKEN®

tapered roller bearings

The Timken Roller Bearing Company, Canton 6, Ohio. Cableaddress: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ontario.

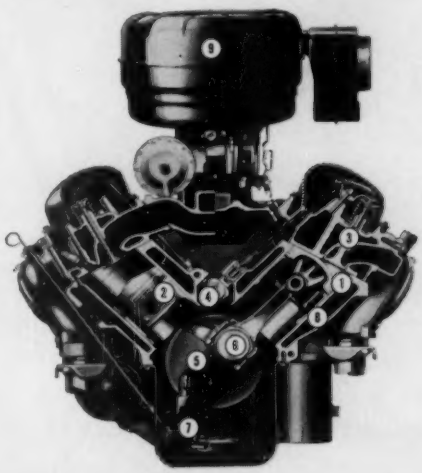
HARD-NOSE UNDER THE HOOD

For moving big loads and saving big money, Chevrolet's Workmaster V8's have know-how aplenty, but knowing when to quit is another story. They've got a stubborn streak a yard wide that keeps them slugging away on the job when lesser engines have given up and gone back to the garage. To put this kind of bullheadedness on a practical, paying basis, only the highest quality design features are good enough, and the Workmasters have 'em all. That's why you'll find them under the hoods of veteran Chevy heavyweights everywhere, under thick layers of grease and grime attesting to thousands and thousands of miles of trouble-free service.

Behind the unique Workmaster brand of performance, durability and economy is a spare-nothing engineering approach which results in a design offering 348 cubic inches of tight-packed, top-level engineering know-how. In either version, the Workmaster or the Workmaster Special, the roster of features offers evidence of truck engineering at its best.

It starts with ultra-uniform, fully machined wedge-type *combustion chambers* ❶ that deliver top smoothness and fuel-stretching efficiency. Aluminum pent-roof *pistons* ❷ are steel-belted at top ring groove, with chrome-faced top and oil rings for long life. Maximum-duty *valving* ❸ includes heat-resistant aluminized inlet and Stellite-faced high-alloy steel exhaust valves, with hardened exhaust valve seat inserts and positive-acting Rotocoils. Valve actuation is by durable roller chain camshaft drive ❹ with self-adjusting hydraulic *valve lifters*. Shock-resistant forged steel *crankshaft* ❺ is induction-hardened at main and crankpin journals for extra-long wear. Premium-quality Moraine 400 main and connecting rod *bearings* ❻ deliver up to seven times conventional bearing life. Full-pressure *lubrication* system is supplied by positive gear-type pump ❼ and includes full-flow oil filter as standard equipment. Pressurized by-pass *cooling system* features full circumference, full length water jackets ❽ to keep temperatures uniform and minimize distortion and wear. And ❾ a 2-pint oil bath *air cleaner* is standard equipment.

These are the features that put Chevrolet Workmaster V8's in the championship class for performance. Why not see your dealer and find out how easy it is to get them working for you! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



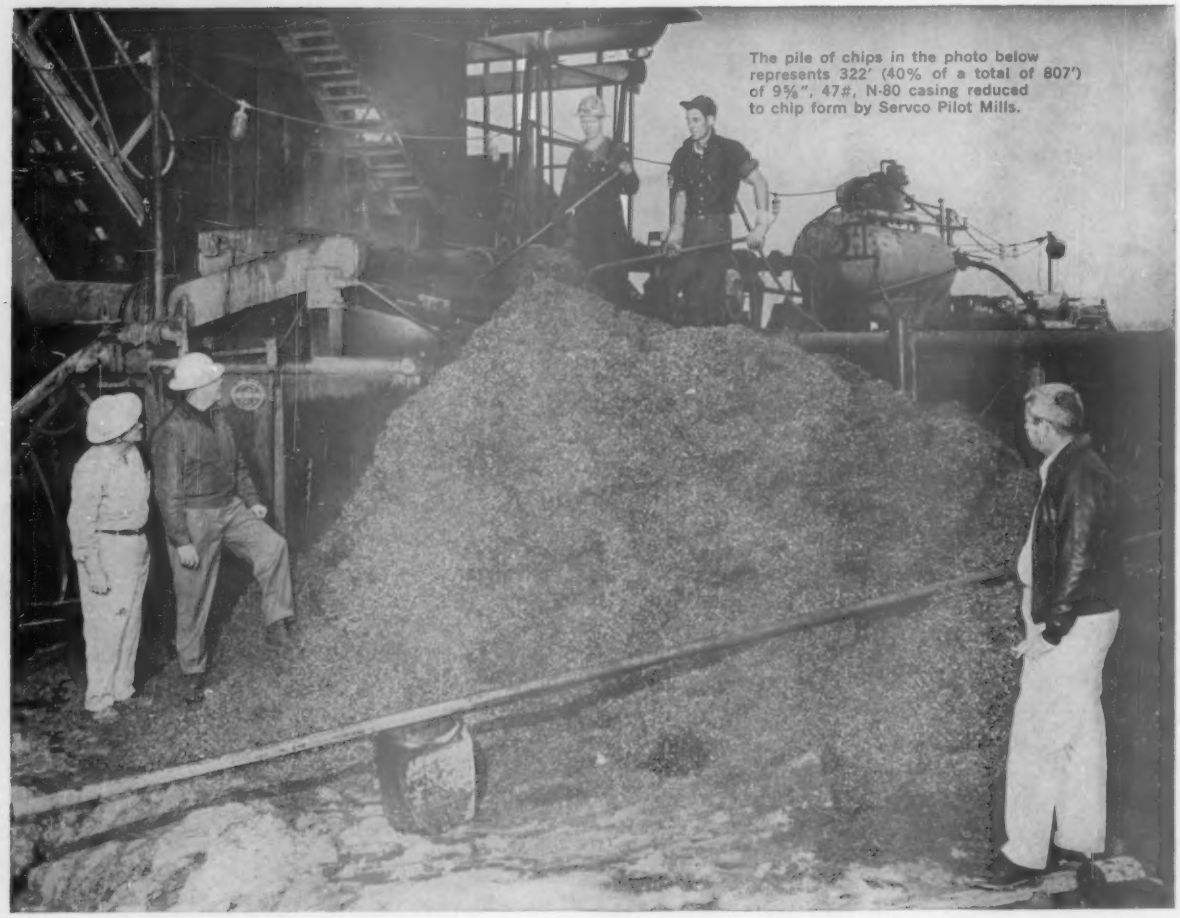
PERFORMANCE DATA	Workmaster Special V8	Workmaster V8
Gross HP @ governed rpm	183 @ 3700	219 @ 3700
Net HP @ governed rpm	160 @ 3700	193 @ 3700
Gross Torque, lb-ft @ rpm	315 @ 2200	335 @ 2800
Net Torque, lb-ft @ rpm	285 @ 1800	302 @ 2600
Displacement, cubic inches	348	348
Carburetor type	2-barrel	4-barrel

MODEL APPLICATIONS

Engine Model	Truck Series	Max. GVW	Max. GCW
Workmaster Special V8	C70, L70, T70	23,000 lb	42,000 lb
Workmaster V8	C80, L80, T80	25,000 lb	51,000 lb
	M70 Tandem	36,000 lb	51,000 lb

1961 CHEVROLET STURDI-BILT TRUCKS

CHEVROLET



The pile of chips in the photo below represents 322′ (40% of a total of 807′) of 9⅝", 47#, N-80 casing reduced to chip form by Servco Pilot Mills.

Servco Pilot Mills mill 807′ of 9⅝", 47#, N-80 casing at an average rate of 4.6′ per hour!

In running a long string of 9⅝", 47#, N-80 X-line casing, the pipe became stuck at 5862′. Free pipe was recovered to 4139′. Approximately one month's fishing time was then spent in cutting and pulling 700′ of casing. At this point SERVCO was called on the job. *In the next 12 days eleven* SERVCO *Pilot Mills milled 807′ of casing (37,929# of steel), including 4 centralizers and 18 couplings, at an average rate of 4.6′ per hour (216# of steel per hour).*

The Pilot Mills used on this job were dressed with SERVCOLOY "S," SERVCO's unique patented steel cutting carbide material. Their performance is typical of the results SERVCO mills give every day. You can obtain these same results with any of SERVCO's tools—they are revolutionizing down-hole fishing and recompletion work.

Ask your SERVCO representative for information. He has the results from nearly 4000 successful jobs to help you.

SERVCO

...the modern drilling tools

General Offices:
2440 Cerritos Avenue,
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Canada: 6909 104th Street, Edmonton, Alberta
Venezuela: Maracaibo
France: 106 rue Lauriston, Paris 16
Trinidad: San Fernando
Field Offices: Ventura, Bakersfield, Lafayette, Harvey, Casper, Oklahoma City, Houston, Odessa, Williston

When it comes to grips...

BJ tong dies and inserts are kind to your pipe!

BJ Red Top Tong Dies and Inserts are safer, stronger, kinder to your pipe. Safer because only the teeth are induction hardened... leaving the rest of the die resilient to resist shock and eye-menacing chipping. Stronger because they're made of high-grade alloy steel to strictest Byron Jackson specifications. This superior metallurgy provides greater "grip-ability" on even the hardest tools and joints... longer life with less down time for replacements. Kinder to your pipe because BJ Red Tops are milled to three tooth patterns—pyramid, standard and coarse. You choose the type that meets your specific requirements. And, for extra care in handling today's high-strength, low-ductility tubing, BJ has developed new curved dies for power tongs. Next time be sure to specify BJ Red Top Tong Dies and Slip, Spider and Elevator Inserts. They're available in sturdy red and white boxes at your favorite supply store.

Byron Jackson Tools, Inc.
A SUBSIDIARY OF BORG-WARNER CORPORATION
P.O. Drawer 2198, Houston 1, Texas
▶MANUFACTURING PLANTS ALSO IN THE NETHERLANDS AND MEXICO

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Chemico process plants are operating profitably all over the map

In many areas of the world, highly-trained process engineers and technicians are a pretty scarce item. In planning process plants, the emphasis must be on trouble-free operation with minimum manpower requirements. Chemico engineers are proud of their reputation for designing efficient and economical plants which start up easily and operate smoothly. From Aruba to Sumatra, from Yokahama to Oklahoma—in 44 states and 33 foreign lands, Chemico-engineered projects continue to enhance that reputation. The estimated erected value of Chemico-designed plants has already passed the $2,000,000,000 mark; and the number of completed projects is now approaching 1,500.

Efficient process plant engineering requires a thorough familiarity with unit operations gained through a wide variety of chemical process design problems. The engineering experience accumulated by Chemico over almost half a century of service to major chemical, petroleum and petro-chemical companies all over the world, forms part of the background which Chemico engineers have developed for undertaking the most complex and extensive projects from the "grass roots" stage through start-up and production.

If you are interested in learning more about Chemico, write to "Department C".

CHEMICO

CHEMICAL CONSTRUCTION CORPORATION

320 PARK AVENUE, NEW YORK 22, N. Y.

CHICAGO / DALLAS / PORTLAND / TORONTO / PITTSBURGH

LONDON / PARIS / JOHANNESBURG / TOKYO

Pioneering with the Oil Industry in

NORTH AFRICA

With another major pipeline well under way, Bechtel extends to North Africa the leading role it played in Middle Eastern oil developments.

The current project—one of three for Bechtel in North Africa in recent months—is a 30-inch pipeline to Marsa el Brega on the Mediterranean across the desert from newly discovered oil fields at Zelten in Libya. The client is Esso Standard (Libya) Inc., Standard Oil Company (New Jersey) affiliate.

Bechtel is constructing the pipeline and parallel highway; a Bechtel-managed joint venture is building a marine terminal and supporting facilities for the pipeline and oil field operations.

BECHTEL CORPORATION
Engineers and Builders for Industry
SAN FRANCISCO • Los Angeles • New York • Houston
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TORONTO • Montreal • Calgary • Vancouver

BECHTEL

The "OILWELL" string...

PRODUCTS

SERVICES

STORES

The "Oilwell" combination of products, services and stores means that when you buy from "Oilwell" you get more than a piece of equipment. You get the added value of higher quality, better design. You get a means of making your job easier and more profitable. You get the assurance of knowing we'll perform on time from one of our many stores, pump shops or regional warehouses. Turn the page for a few examples of why the "Oilwell" string of products, services and stores runs first in the oil country.

USS

Oil Well Supply
Division of
United States Steel

The "OILWELL" string...

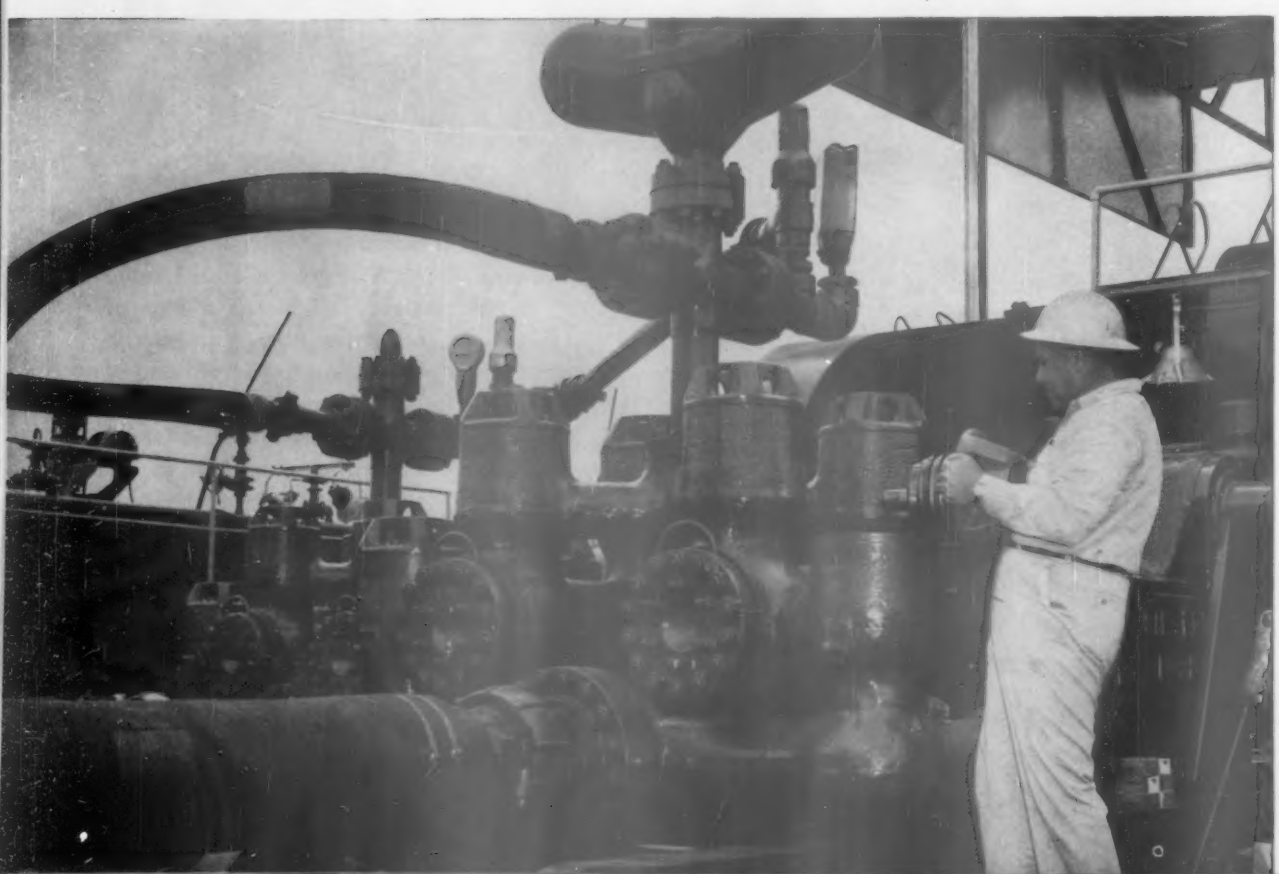
PRODUCTS
SERVICES
STORES

The right way to use a slush fund... buy "Oilwell" Fluid End Parts

Genuine "Oilwell" Fluid End Replacement Parts are made to the same high standard of quality and workmanship as your original "Oilwell" and Wilson-Snyder slush pumps. They are designed to the exact requirements of your equipment. They suit the hydraulic conditions for which your pumps were designed. And, because each part is carefully packaged in its own protective container, you'll find it clean and ready-to-use when you need it. If you want top performance, minimum down time, and low-cost operation, use only genuine "Oilwell" Fluid End Replacement Parts. Your nearest "Oilwell" store stocks them . . . as well as a variety of other maintenance supplies.

These are prime examples: DI-HARD LINERS—give much longer service with little extra cost.
HI-HARD PISTON RODS—have *hard* wearing surface on high tensile core.
CHROMEX PISTON RODS—have extra coat of chrome.
"4-on-1" PISTONS—have the *never-wear-out* body.
VALVES AND SEATS—have more metal-to-metal contact plus greater flow area.
ROD PACKING, LINER PACKING AND GASKETS—are made to rigid specifications.

USS, "Oilwell", DI-HARD, HI-HARD and CHROMEX are registered trademarks

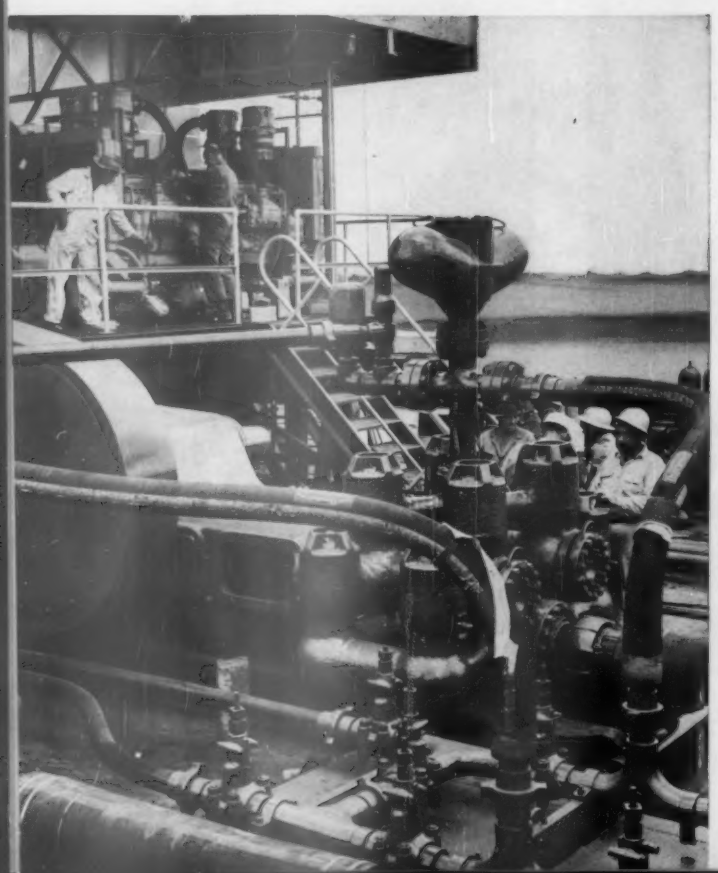


How's this for engineering service?

Want a land draw works and drive adapted to the space limitations of a particular offshore platform? Need special unitizing designed for your pumps? Or help in selecting the most suitable rig components for a specific job? There's one man who can give you the solutions to these and many other ticklish problems: your "Oilwell" field engineer.

There's an "Oilwell" engineer near you, and you can be sure he will see that you get the most economical operation out of your "Oilwell" equipment. If you are looking at new equipment, he'll see to it you don't "over-buy." If you're heavying-up or considering slim hole work, his know-how will prove of real assistance.

The next time you're rigging up or buying new machinery, call in the "Oilwell" engineer. He'll show you how planning pays off. And his advice is free.



If you're rigging up, don't forget friction tape

Or any one of a hundred other small but essential supplies that you'll need on your rig. Make a list of everything you think you'll need, then give your list to the nearest "Oilwell" store. We'll make sure you haven't left anything out. We're familiar with your needs, and we carry it all. "Oilwell" stores sell not only major items of drilling equipment, but also those innumerable little items like fuses, friction tape, hammers, axe and sledge handles, solder, wiping rags, even flashlight batteries. Get it all, all at once, from your "Oilwell" store.

USS TRADEMARK

Oil Well Supply Division of United States Steel

Executive and Export Offices: Dallas, Texas

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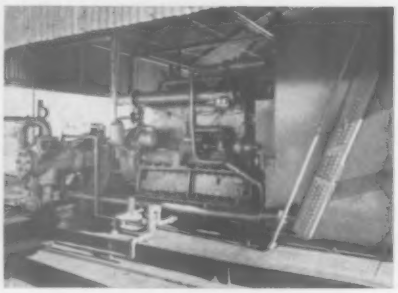
WAUKESHA

power for:

DRILLING • COMPRESSORS
WATER FLOOD • PIPE LINES
PUMPING • ELECTRIC POWER



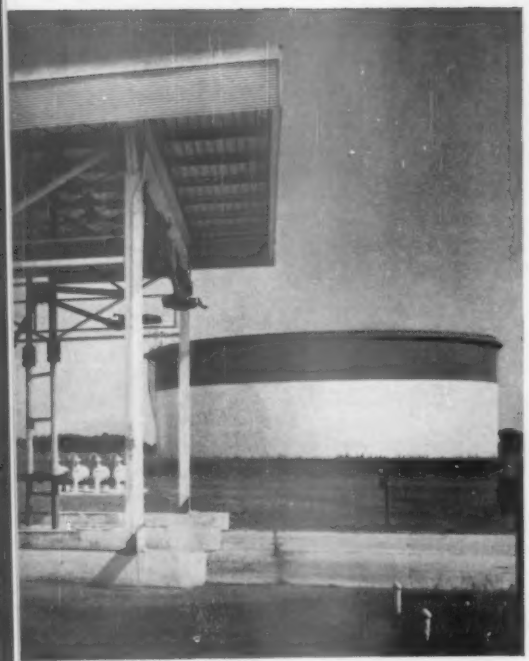
WORLD'S FINEST OIL FIELD POWER
10 to 1235 hp
BOTH DIESELS AND "BUILT-FOR-GAS" ENGINES

520

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN / **New York • Tulsa • Huntington Park, Calif.**
Factories: Waukesha, Wis.; Clinton, Iowa; Houston, Texas

ASSURANCE

of unsurpassed performance at terminals with CB&I Floating Roof Tanks



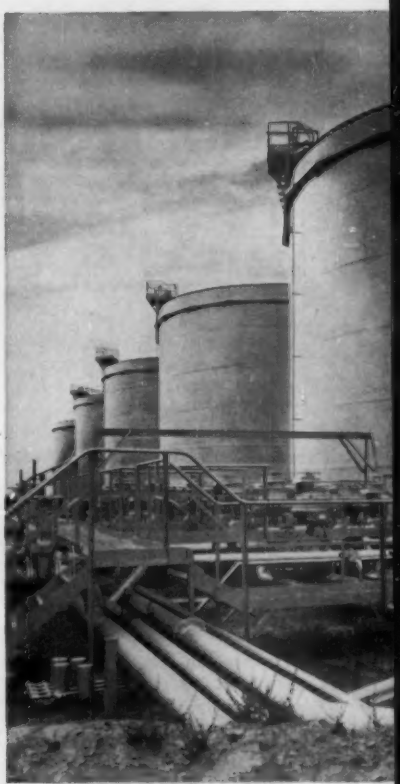
Superior design, construction and performance repeat again and again as the reasons why CB&I floating roof tanks are being installed at terminals throughout the world in ever-increasing numbers each year.

Performance is superior in two ways: First, in reducing evaporation loss, retarding corrosion and minimizing fire hazards. Second, in smooth, trouble-free operation, particularly when throughput is high.

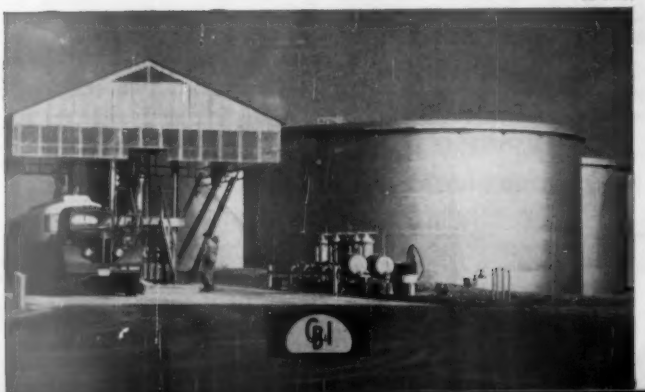
CB&I offers the widest choice of Horton seals, including:

SR3—Metallic Seal
SR5—Liquid Filled Fabric Seal
SR6—Inflated Fabric Seal
SR7—Resilient Foam Fabric Seal

Write for Brochure B, "Floating Roof Tanks." Chicago Bridge & Iron Company, 332 S. Michigan Avenue, Chicago 4, Illinois. Offices and subsidiaries throughout the world.



CB-6119



CB&I

FRACTURING TREATMENTS *"PEP UP"* TIRED OIL AND GAS WELLS

More oil field and gas field operators than ever before are now relying on "frac" jobs to counter the declining production of a new well . . . or to inject new life into an apparently "dead" well. This method of well stimulation works by "fracturing" underground formations with large volumes of fluid (slurry), pumped into the oil- or gas-producing zone under high pressure. This opens up new passages for the oil or gas to flow into the well . . . often raising "bopd" tenfold!

The Ford Industrial Engine shown above is being used to pump the slurry to the high pressure pumps. The success or failure of the "frac" job is dependent upon the steady, reliable flow of thousands of gallons of slurry to these pumps. That's just one reason for the big swing to Ford power . . . it's *dependable* power!

No matter the oil field conditions, Ford Industrial Engines are rugged! And they're *compact* . . . delivering more horsepower per pound of engine weight *than ever before possible!*

Ford alone offers a full line of modern, overhead-valve-design engines to meet your *exact* power requirements. Ford's short stroke design minimizes friction, lengthens engine life and squeezes more *usable* power from every drop of fuel. Overhead valves provide easier, quicker servicing. And to further eliminate the downtime gremlin, your nearest Ford Dealer carries a complete stock of all the more commonly purchased replacement parts.

Ford engines range from 134 to 534 cubic inches, including modern diesels. Engine assemblies are available as complete power units, foot- or skid-mounted.

Call or write us today . . . we'll be glad to help you select the *right* power for *your* job.

YOUR OIL FIELD JOB IS WELL-POWERED WHEN IT'S FORD-POWERED!

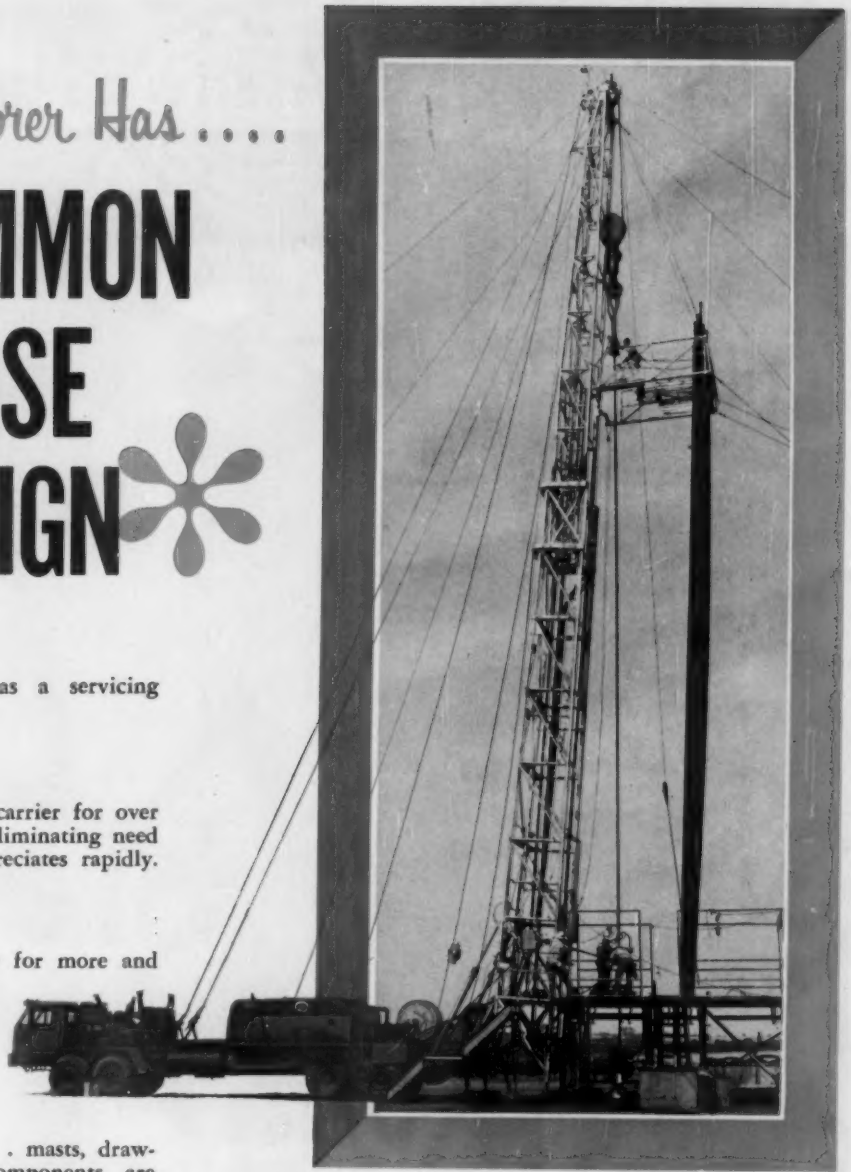
Ford
INDUSTRIAL ENGINES AND POWER UNITS

INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 135, DEARBORN, MICH.

West of Rockies write to:
FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.
FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.

Franks Explorer Has....

COMMON SENSE DESIGN



CSD...

Primarily designed as a servicing and workover rig.

CSD...

Mounted on rugged carrier for over the road travel . . . eliminating need for truck which depreciates rapidly.

CSD...

Industrial horsepower for more and faster work.

CSD...

Greater flexibility . . . masts, drawworks and other components are interchangeable. Your unit is always up-to-date.

More Franks Explorers are sold than any other competing make — pretty good proof that the Franks Explorer **packs more punch!** Ask your Franks Representative for the facts.

WELL SERVICING AND DRILLING UNITS

FRANKS

PAMPA, TEXAS

CABOT

CABOT CORPORATION
MACHINERY DIVISION

Worth more when you BUY 'EM . . . Worth more when you TRADE 'EM

"I need a fluid-loss additive like I need a new truck!"

You can bet on it, Charlie!

The fact is, fracture extension calculations by service companies usually indicate the need for a fluid-loss additive. And none gets more mileage than ADOMITE-MARK II!

This isn't just talk, Charlie. In over 30,000 fracturing treatments ADOMITE has done a cracking good job.

Larger fractures. Faster payouts. Greater long-run economy. That's the ADOMITE record.

You get larger fractures per volume of fracturing fluid . . . or same-size fractures with less fluid volume . . . with ADOMITE. That's why among operators who use a fluid-loss additive, eighty per cent choose ADOMITE!

Ready for a trade-in, Charlie?

For more information, contact your service company or these ADOMITE men!

R. T. Means, P. O. Box 431, Midland, Texas, MU 4-7411
T. M. Brown, Pampa, Texas, Phone MO 5-2992
J. M. Foster, Wichita Falls, Texas, Phone 723-8181
J. D. Hawsey, Midland, Texas, MU 4-7411
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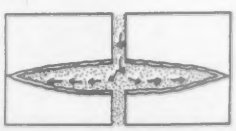
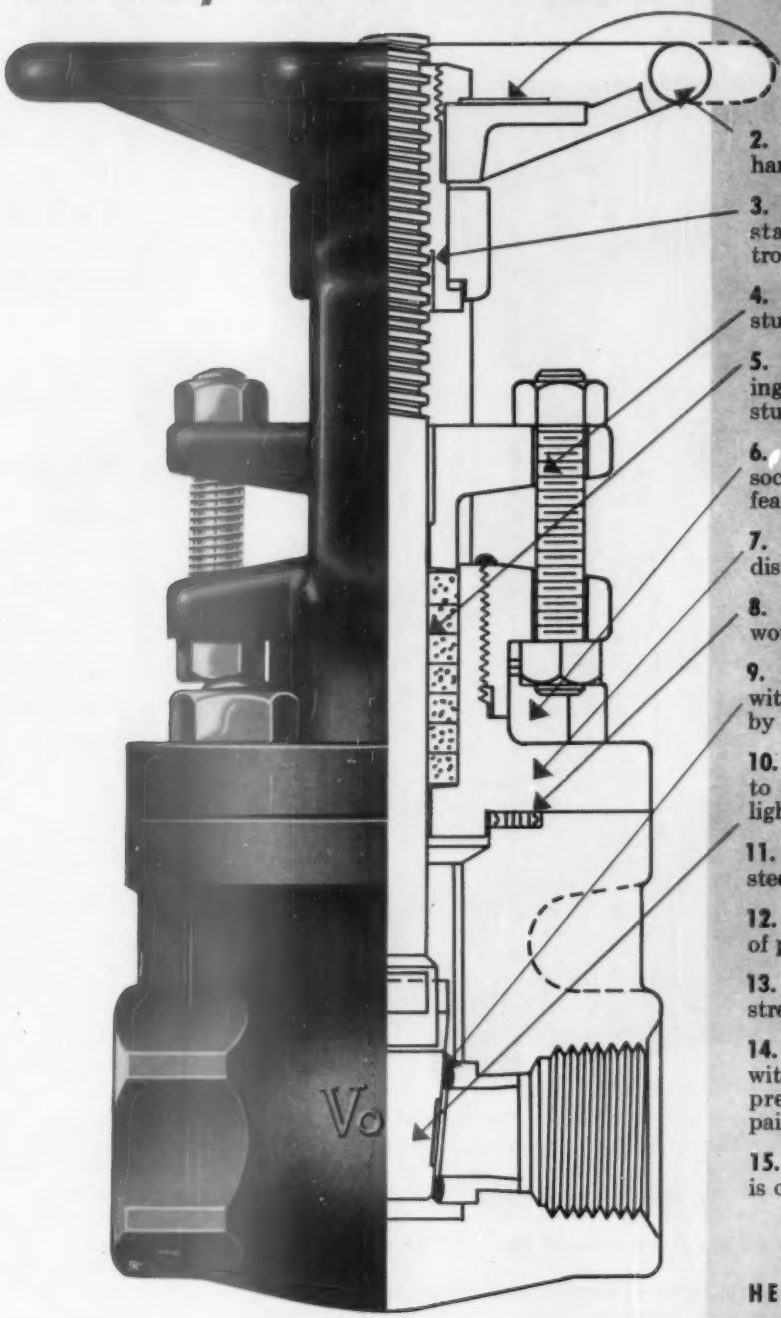
ADOMITE®
...fluid-loss additives



"30,000 frac jobs can't be wrong!"

The only valves with ALL these features!



1. Complete identification on metal disc.
2. Depressed-center, knobbed handwheel avoids hand injury.
3. Hi-temperature, anti-galling stainless steel yoke nut insures trouble-free service.
4. Stainless steel packing gland studs and nuts won't corrode.
5. Quality general purpose packing in the only adequately sized stuffing box in the industry.
6. Bolting nuts have clearance for socket wrenches — a real safety feature!
7. Round bonnet flanges for even distribution of bolting stresses.
8. Widest, best designed, spiral wound gasket for leak proof service.
9. All gate valve seats hard faced with Stellite — standardized only by Vogt.
10. Stainless steel gates hardened to 500 Brinell with flatness of two light bands (.000022 inches).
11. All pressure parts are forged steel to insure safety.
12. Maximum interchangeability of parts.
13. Fillets on all corners increase strength.
14. All exterior surfaces are treated with a phosphate coating for rust prevention and as a base for painting.
15. A complete line of Vogt valves is carried in stock.

For literature write to Dept. 24A-FO.

HENRY VOGT MACHINE CO.

P. O. Box 1918, Louisville 1, Kentucky

Vogt FORGED STEEL VALVES

fittings, flanges & unions

SALES OFFICES: Camden, N. J., Charleston, W.Va., Chicago, Cleveland, Dallas, Los Angeles, New York, St. Louis

For Direct Long Distance to Louisville dial: 502 ME 4-9411

A DP TRANSMITTER

212T TRANSCOPE® Indicating Flow and DP Transmitter gives you all the features you expect from a truly fine DP Transmitter . . . and the only one that can be calibrated linear with flow as well as differential pressure without changing parts.

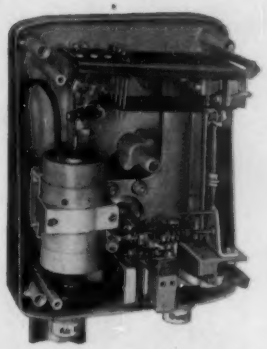
Taylor Instruments

OF MANY USES!

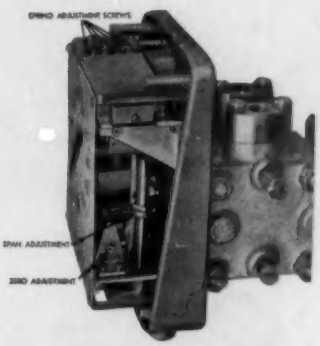
New Taylor 212T Transmitter is first and foremost a superior DP Transmitter...

Taylor's 212T TRANSCOPE® Transmitter is an outstanding example of "all this and heaven too". Basically it is a sound DP Transmitter, but when used for flow it can be calibrated to give a linear output without additional parts. It's available in indicating or non-indicating models. And with all its superior features *you pay no premium in price.*

Check the highlights listed here, then call your Taylor Field Engineer for a demonstration and write for **Bulletin 98413.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Ontario.



Open case design provides free access for maintenance.



Diagonally split case gives easy access for all adjustments.

Liquid-filled primary unit means:

Positive overrange protection. Hydraulic overrange protection to full body rating in *either* direction.

Isolation of internal parts. Working parts—except diaphragms themselves—are exposed only to non-corrosive silicone oil.

Built-in damping. Effective pulsation damping occurs at frequencies greater than approximately 2 cycles per second.

Exceptional rangeability.

Normal range span is 20 to 250" water. However, superior design and engineering quality permits over-calibration in either direction with good performance.

Mounting and connection versatility for any installation.

Process connections can be at top, at back or at bottom. ½" NPT fittings set on 2⅛" centers for convenience in piping directly to standard orifice flange taps. Universal mounting bracket can be secured to standard 2" horizontal or vertical pipe, or bolted to flat surface.

Good, clean mechanical design.

Diagonally split case makes all calibration adjustments easily accessible by simply removing cover. Zero adjustments can be made externally. Sturdy, protective case, designed for field locations.

PLUS

Servo power for square root extraction.

Produces an output directly proportional to flow or differential pressure . . . a cost-and time-saving feature when applied to computer control, or ratio and cascade control systems.

Servo power for indication accuracy.

Powerful servo relay drives tape movement to provide indication on a big 11¾" scale. It eliminates the necessity for externally mounted receiver gages.

Non-indicating model, showing rear mounting and bottom process connections.

MEAN ACCURACY FIRST

now...UOP offers 18 ADDITIVES for petroleum product quality control

From Down-hole to engine combustion there is a UOP additive or combination of additives for the efficient protection of your petroleum products.

Product	*Application*
OXIDATION INHIBITORS	
UOP No. 4*	Prevents gum formation and lead deposition in unstable gasolines.
UOP No. 5*	Prevents gum formation and stabilizes TEL . . . catalyzes air oxidation of mercaptans.
UOP No. 5-S*	Similar to No. 5, but catalyzes sweetening at a sharply increased rate.
UOP No. 7*	For relatively stable gasolines; stabilizes TEL, is insoluble in acid or alkaline tank bottoms.
UOP No. 5-7*	33⅓% solution of No. 7 for liquid injection into gasoline.
UOP 88*	Minimizes gum formation in stored gasolines, stabilizes TEL, catalyzes air oxidation of mercaptans.
UOP 88-S*	Effective antioxidant, similar to 88, but with increased sweetening ability.
LUBRICANT ANTIOXIDANTS	
UOP 216* and UOP 225*	Ashless high-temperature antioxidants effective as stabilization agents against oxidative deterioration in lube oils and greases. Also provide corrosion protection for a broad range of metals.
CORROSION INHIBITORS	
UNICOR®	Oil soluble, film-forming corrosion inhibitor for producing, petroleum refining, and transportation equipment.
UNICOR® LHS	Light hydrocarbon-soluble corrosion inhibitor for gasolines of above-average volatility . . . excellent anti-icing agent.
COPPER DEACTIVATORS	
Regular Grade	50% active ingredients, prevents copper contamination from catalytically accelerating gum formation in high-grade gasolines.
AW (50)*	50% active ingredient, recommended for use where temperatures drop below freezing.
FUEL OIL ADDITIVES	
DRIACIN®	Established sludge dispersant, excellent rust preventative in storage tanks.
POLYFLO® 100 POLYFLO® 120 POLYFLO® 121 POLYFLO® 130	Fuel oil dispersants that inhibit degradation of color and formation of sediment in distillate oils . . . peptize sediment in processing equipment.

*TRADEMARKS

UOP PRODUCT SPECIALISTS

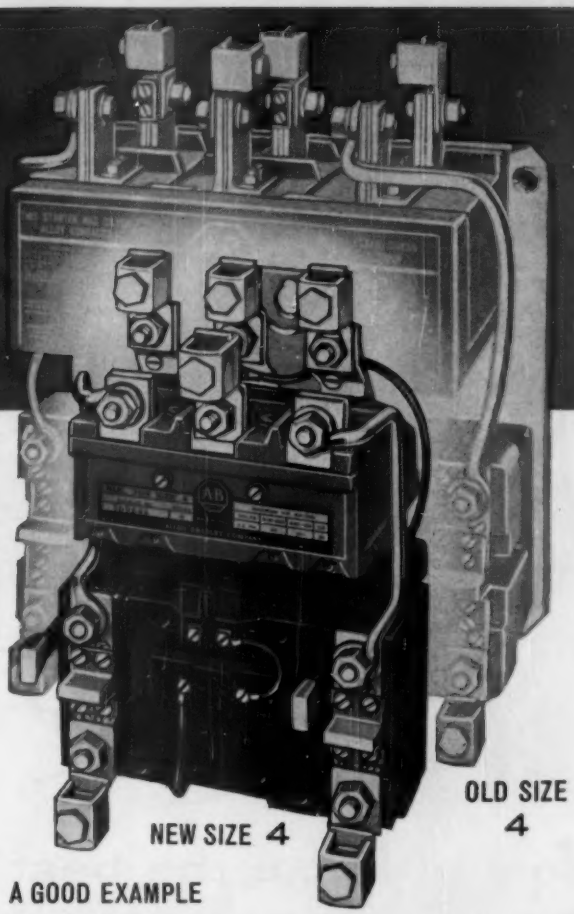
Universal maintains a staff of product specialists located in strategic areas of the world. These specialists are available to analyze your product quality problems and recommend the most effective and economical solution. Call or write our Products Department.

UOP

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U.S.A.
WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW

A-B QUALITY

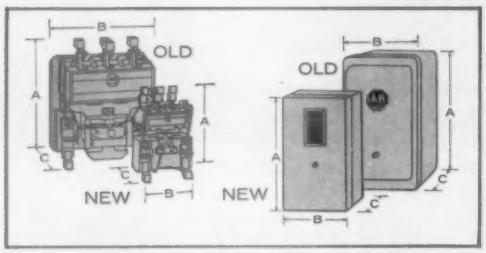
You get BIGGER PERFORMANCE



A GOOD EXAMPLE

Plus SMALLER SIZE

with the new Allen-Bradley Bulletin 709 Starters



The new revolutionary Bulletin 709 motor starters are surprisingly small in size—yet, they are good for many more millions of operations—without trouble or maintenance! Rating for rating, they have no equal. They are today's best starter value—and they cost no more!

The "Quality" you've come to expect in all Allen-Bradley control is represented in all details—especially in the "eye appealing" enclosures styled by the world famous industrial designer, Brooks Stevens. Write today for details of the new Bulletin 709 line—the greatest advance in motor control in 30 years: *Allen-Bradley Co., 1304 South Second Street, Milwaukee 4, Wisconsin.*

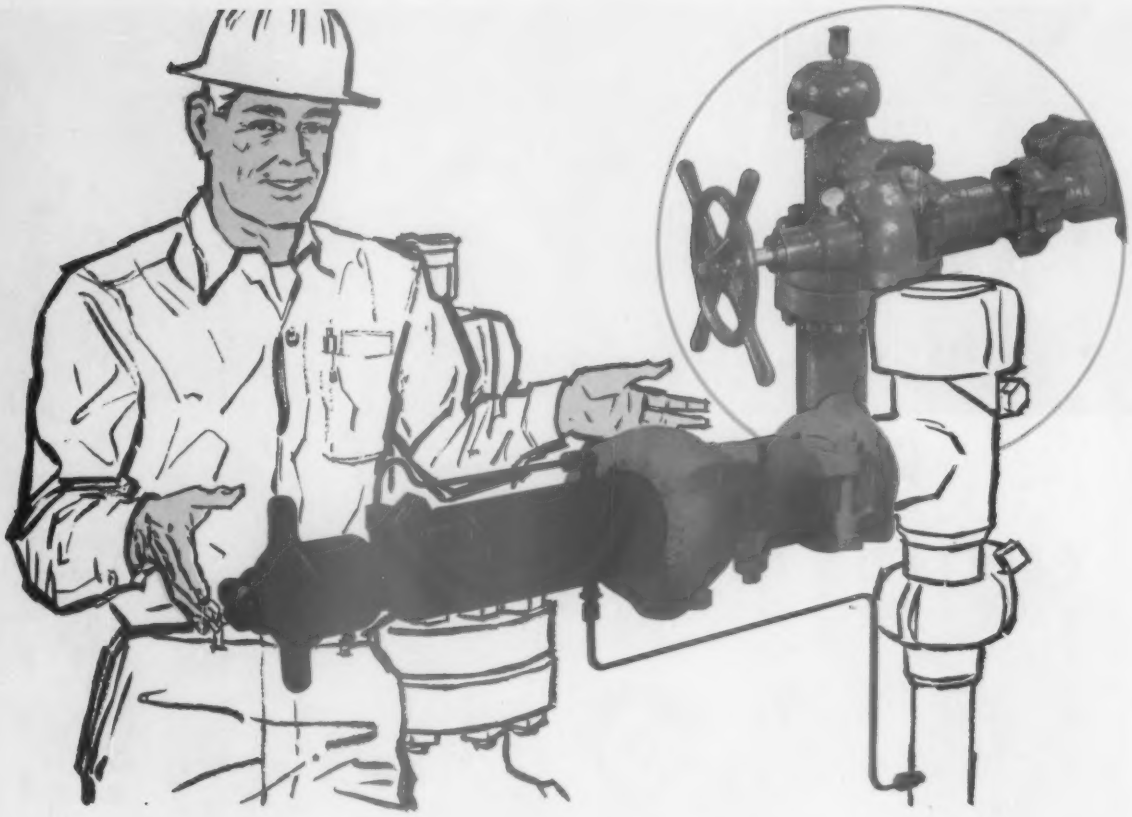
Check These New SPACE-SAVING Dimensions

Starter Size	OPEN TYPE STARTERS						NEMA 1 ENCLOSURES					
	Height A		Width B		Depth C		Height A		Width B		Depth C	
	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
00	3⅜	—	3⅞	—	3¾₆	—	7⅝	—	4⅞	—	4¼	—
0	5⅞	5⅝	4⅛₆	4¾	3¹⅛₆	3¼	9⅛	7⅞	6⅝₆	5⅝	4⅜	4¼
1	6⅝	5⅞	4½	5	3¹⅛₆	3¼	10	8¹³⁄₁₆	6¹³⁄₁₆	6⅜	4⅜	4¼
2	7⅝	10¹⁄₁₆	4⅝	5¾	3¹⅛₆	4⅞₂	12	14½	7⅝	9	4⅜	5⅞₆
3	10¼	12⅝	6¼	7¼	5⅞₆	5⅞₆	16⅝	19½	10⅜	11⅜	7	6¹⅛₆
4	11⅞₆	16¼	7⅝₆	12¾	6¼	6¹⅛₆	22	26⅝₆	11⅝	14⅜₆	8	7¹⅛₆
5	14¹³⁄₁₆	20	9	16⅛	6½	8¾	32⅜₆	41½	17⅜₆	19⅝₆	9⅞	13⅝₆

ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL



How to make the best Christmas tree a whole lot better

old trees: Convert your Unibolt Wing Valves to Unibolt Pressurematics by replacing the stem/bonnet assembly with the Pressurematic unit.

new trees: Specify Unibolt Pressurematic Wing Valves. They give you high/low safety plus a shut-off for choke changing.

Here is a valve that does the work of two valves yet costs little, if any, more than a good high pressure valve alone. It operates manually for choke changing, or automatically as a high-low safety valve.

The UNIBOLT PRESSUREMATIC VALVE combines all of the time-tested and proven features of the Unibolt Adjustable Wing Valve with a novel automatic actuating accessory. The valve closes instantly when a predetermined pressure balance across the seat is disturbed. The actuating mechanism consists of a small piston which is exposed to well pressure and a larger piston which is exposed to flowline pressure. A broken flowline or open valve, for example, in the production system, would lower the flowline pressure and thus instantly close the valve. Inversely, a rise in the flowline pressure, for any reason, would cause the valve to close.

Once closed, the valve may be easily opened and set manually for automatic operation.

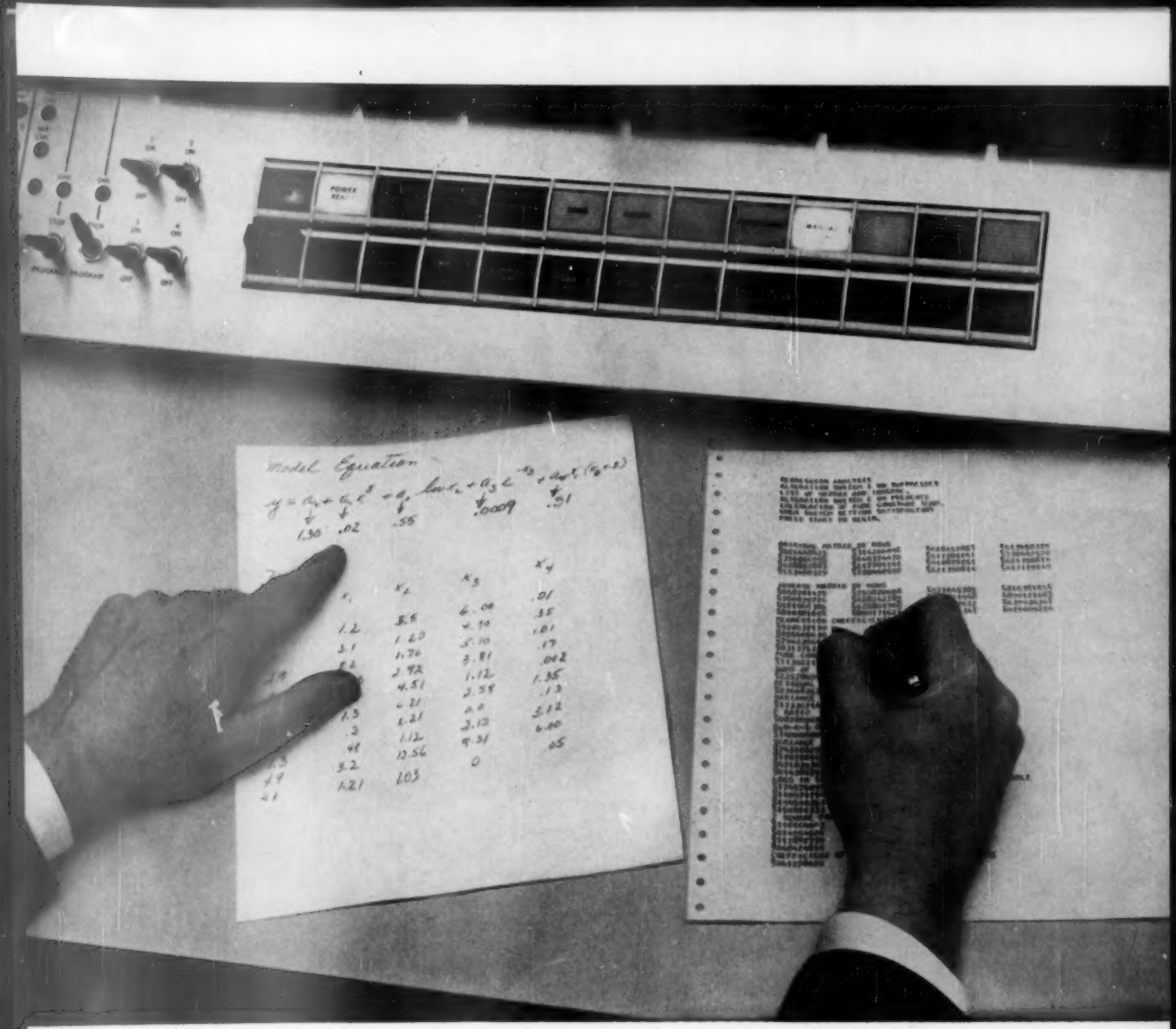
Send for literature or contact your nearest UNIBOLT sales representative.

UNIBOLT

THORNHILL CRAVER CO.

P. O. Box 1184, Houston, Texas

Reagan County, Texas *Ward County, Texas* *Monument Field, New Mexico*



Want to find the coefficients? It's easy with the new Regression Analysis program for the IBM 1620

Here's another program offered free-of-charge to users of the IBM 1620 Data Processing System. It gives you the kind of results you might expect only from a much more expensive computer. But users of the 1620 know that its low rental cost is deceptive. The 1620 packs *more computing power per cubic inch* than any other computer in its size range.

The Regression Analysis program is a good example. Suppose you want a fit for production purposes. If you employ more than two variables you probably have difficulty visualizing the representation of your data. If linearity is not the case, you must often guess blindly at a polynomial of high degree, accept or reject the fit with something approaching a sixth sense, and either try again or settle for the results you have.

The new Regression Analysis program lets you handle expressions containing up to *24 variables*. If you have the even more complicated task of handling many dependent variables, the program will generate regression coefficients with a maximum number of dependent variables not exceeding one-half the number of independent variables.

This program will also fit non-linear functions and hyper-surfaces. Compare this performance with that of any other computer in the 1620's price range.

A basic 1620 installation rents for just $1600 per month. For details, contact your local IBM Representative.

IBM's 1620 is a compact desk-size computer.

IBM®
DATA PROCESSING

Moisture removal for third magnaflux test of every length of E.W. line pipe

TEST

quality control tests make sure Youngstown line pipe won't fail in the field

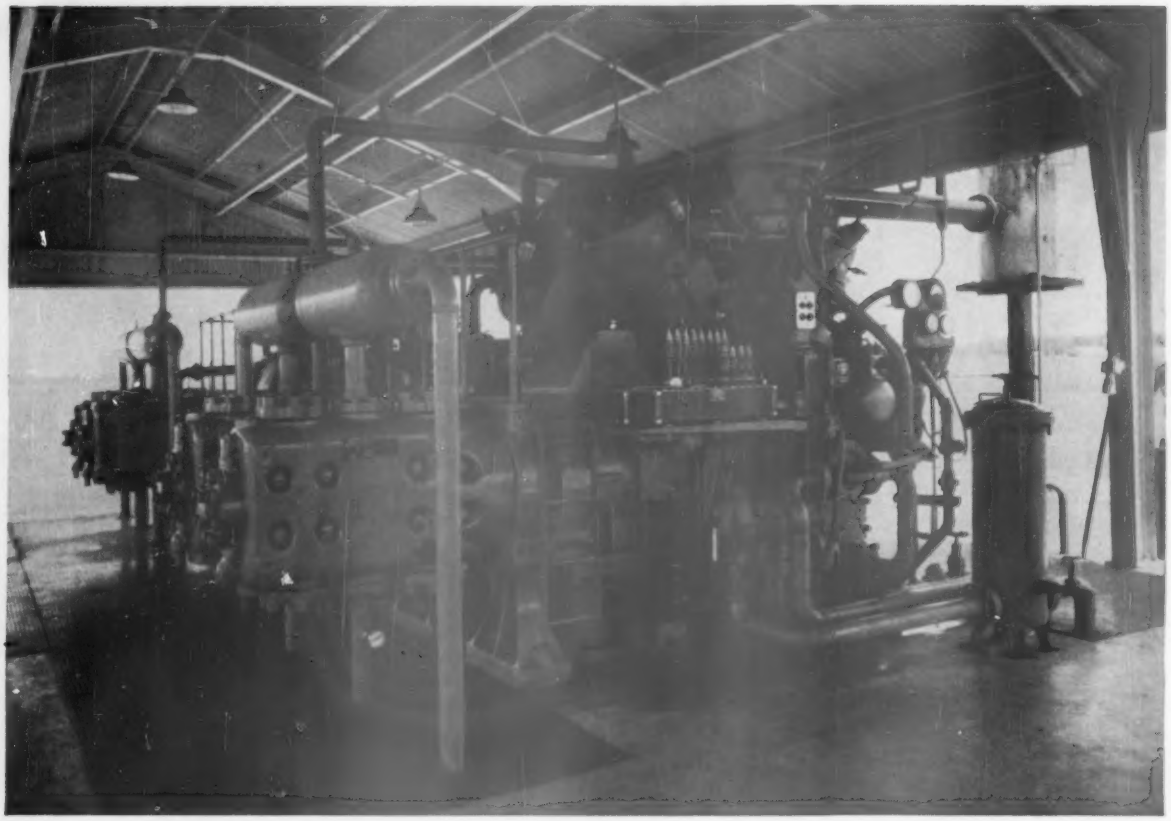
Take the pipe and check the weld. Then crush an end. Burst a length. Pressure-test it hydrostatically. From ore to steel to final stenciled product, separate mechanical and visual inspections make sure Youngstown line pipe won't fail in the field.

Get Youngstown Electric Weld line pipe in sizes 6⅝" to 22" O.D. Get it in time and money-saving long lengths to 55 feet. Order Youngstown Seamless line pipe in sizes 2⅜" to 14" O.D., Continuous Weld line pipe in sizes ⅛" nominal to 4½" O.D. Get it fast, when and where you want it, through Youngstown District Offices, through any one of 900 independent pipe distributors.

Count on Youngstown for line pipe you can depend on. For gas and oil gathering, transmission and distribution lines. For product lines from petrochemical plants and refineries. For quality pipe wherever line pipe is needed. You get value and performance when you buy line pipe from Youngstown, world's second largest pipe producer.

Youngstown – growing force in steel

For complete information about Youngstown line pipe, write Dept. 18-B,
The Youngstown Sheet and Tube Company, Youngstown, Ohio.



MORE PUMPING TIME, LESS DOWNTIME...

Ambitrol coolants protect against freezing and corrosion

DOUBLE PROTECTION against industrial engine downtime is now available through two new Dow products—Ambitrol* FL and Ambitrol CN coolants. In addition to affording complete freeze protection, Ambitrol offers two methods for combating the widespread problems of local water hardness and corrosiveness.

Ambitrol FL industrial cooling system fluid completely fills the system, requiring no dilution—problems with local water conditions are eliminated. This product is designed to provide freeze protection for industrial cooling systems down to –40° F., with protection against overheating up to a temperature of 240° F.

Since inhibitor depletion can still occur in any cooling system due to extremely severe operating conditions, leakage, etc., Dow provides a further protection with the Dow *Cooling System Maintenance Program.* This is a product analysis service in which periodic samples of the Ambitrol in use are sent to the Dow Industrial Coolants Laboratory. Reports on these samples are returned to the user and contain full information for servicing to maintain both freeze protection and inhibitor effectiveness.

Ambitrol CN is a freeze-depressant concentrate which is blended with local water at the site. Its inhibitor system offers superior protection against damage from corrosion even in the many varieties of water throughout the United States. As with Ambitrol FL, users of Ambitrol CN can participate in the benefits offered by the Dow *Cooling System Maintenance Program.*

Ebullient cooling has solved many of the problems of bigger and more powerful engines, new alloys, and closer tolerances that impose exacting demands for uniform engine temperature control. Ebullient cooling, one system designed to control temperature within a narrow range, is gaining in interest and use. The system calls for chemical compounds radically different from those used in conventional cooling systems. From its continuing research, The Dow Chemical Company developed Dowtherm® 209 coolant to meet these new demands for uniform engine temperature control. Today, Dowtherm 209 is used by many stationary engines having ebullient cooling systems. Its properties offer freeze protection, ideal operating temperatures, and extreme corrosion resistance.

For more information on Ambitrol, Dowtherm 209, or any petroleum industry problem involving chemicals, write directly to THE DOW CHEMICAL COMPANY at Midland, Michigan.

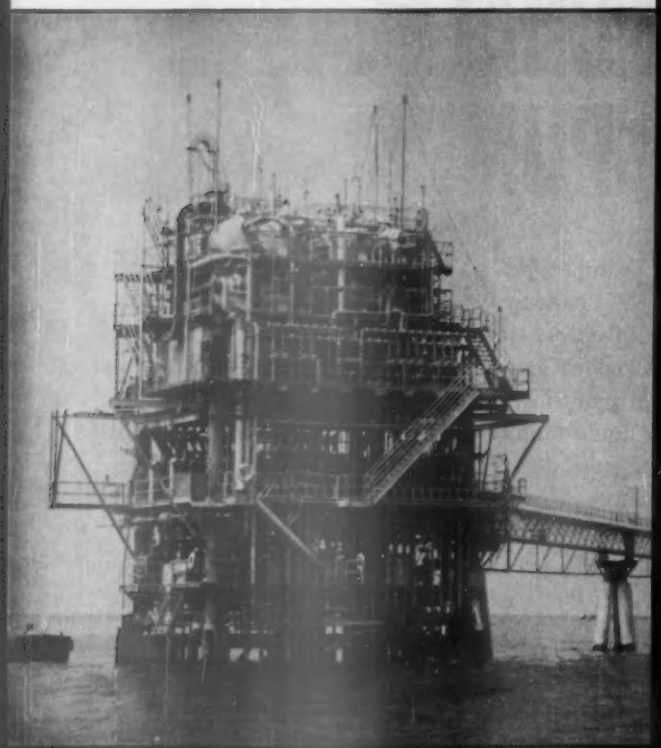
*TRADEMARK

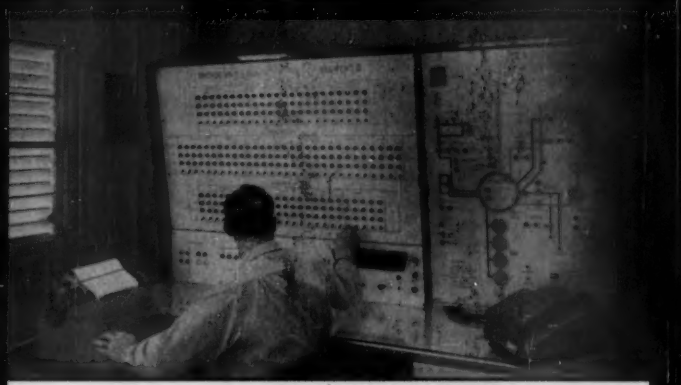
THE DOW CHEMICAL COMPANY DOW Midland, Michigan

TI PROCESS CONTROL SYSTEMS

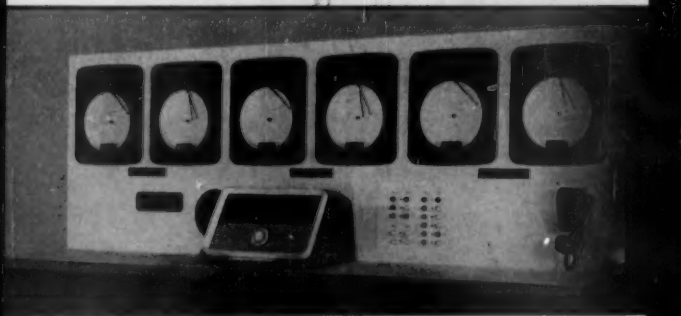
Automate Petroleum Production!

Unattended crude gathering station in Venezuela's Lake Maracaibo automatically controls production of 48 completions.





SACROC supervisory control system in West Texas automatically tests wells, records all data over entire 76-well project.



On-shore console supervises and controls automated offshore producing platform near Corpus Christi, Texas.

Electronic equipment designed, built and installed by Texas Instruments controls the *unattended* production of crude in locations throughout the world. In the Lake Maracaibo installation, for instance, TI's process control system monitors flow and pressure from each completion; monitors and controls all functions of flow station operation, including automatic start-up, shut-down and well testing; and throughout the entire 100,000 BPD operation logs complete records of production and testing into punched paper tape.

In case of a malfunction — for example, a pump or engine failure — the system analyzes the situation, takes corrective measures, and sends classified alarm information to the remote monitoring station by radio. A maintenance engineer can then go to the seat of the trouble without repeating corrective measures already taken automatically. TI has recently contracted to provide the electronic equipment on two similar flow stations in Lake Maracaibo.

For West Texas' SACROC field, *the country's largest unitized oil producing operation,* TI designed a supervisory control and data gathering system that provides automatic and manual control for testing any of 76 wells, returning it to production or shutting it in. Wells on test are subjected to gas, oil and water separation with resulting data printed out in the central console.

Texas Instruments experience and abilities in petroleum automation systems are being applied in many fields of industrial process control and automation. TI's capacity for design and application of precise instrumentation assures efficient handling of the most complex projects.

Write for complete information.

APPARATUS DIVISION
PLANTS IN HOUSTON
AND DALLAS, TEXAS

TEXAS INSTRUMENTS
INCORPORATED
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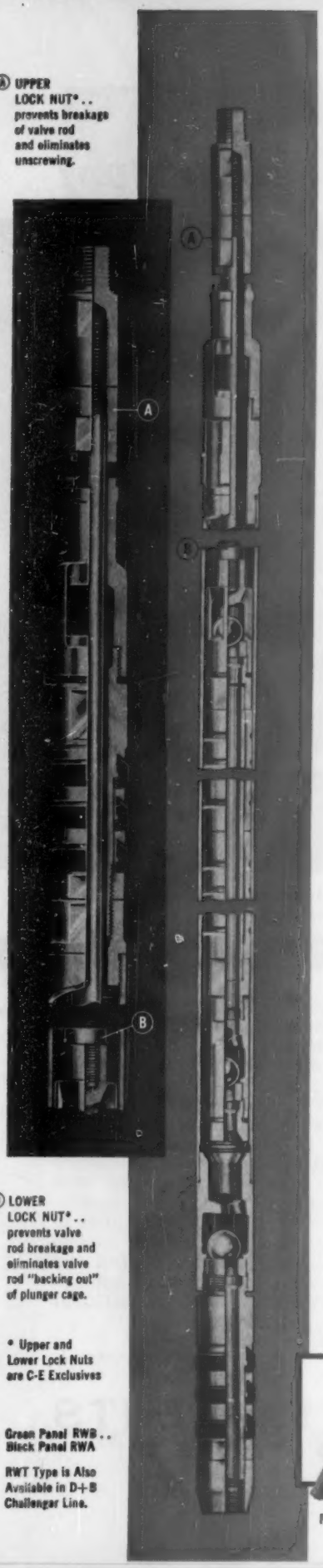
It takes only one line
to pump all medium to deep wells

CONTINENTAL-EMSCO D+B CHALLENGER PUMPS



A UPPER LOCK NUT*.. prevents breakage of valve rod and eliminates unscrewing.

B LOWER LOCK NUT*.. prevents valve rod breakage and eliminates valve rod "backing out" of plunger cage.

*** Upper and Lower Lock Nuts are C-E Exclusives**

Green Panel RWB.. Black Panel RWA

RWT Type is Also Available in D+B Challenger Line.

Various metals, pump types and pump combinations give *extra flexibility* to D+B Challenger pumps. Interchangeability of their API parts cuts inventory costs. Types are available for all well conditions .. crooked or slant holes .. medium deep to wells over 7,000′. Challenger pumps can be assembled to pump stripper wells, sandy or gaseous fluids. Many corrosive resisting plunger-barrel tube combinations and special cages, fittings and balls and seats can be selected to handle sweet, sour or oxygen corrosion. Special pump combinations to provide extra volume, pump extremely gaseous fluids and meet other well peculiarities can be assembled from standard Challenger pump parts with the use of only a few special parts.

Special Features

VALVE ROD COUPLING AND WING LOCK NUT allow precise spacing of traveling and standing valve for maximum pump efficiency.

PLUNGERS are made of various corrosion resisting metals. They are interchangeable between all types of Challenger pumps and may be switched *end for end* within pumps for longer wear. Plunger sections may be replaced economically after long and hard usage.

ARMORED CAGES are precision machined and given special heat treatments. Ball guides are treated to an extreme hardness to resist wear and assure long life. Outside diameter of body of the cage is given another special heat treatment to insure toughness and durability. C-E's Armored Cages are standard in the make-up of the Challenger pump.

Put D+B Challenger pumps
to work in your wells.

For Service that Sings..Equipment that Hums..Go..

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

P 906

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Which one contains Olin ethanolamine *

*the one that's closest to you

(of course!)

Once you've established product quality, the ethanolamine that's closest to you is your best buy. A nearby source means dependability and convenience. That's why Olin distributors can so well serve gas purification installations.

When you need a shipment of ethanolamines, call one of the locations listed below. They have ample stocks (mono-, di- and tri-) in bulk and drums, ready for immediate delivery to your operation. For the name of distributors in other areas, for product specifications or samples, phone or write—
OLIN MATHIESON, Organic Chemicals, 745 Fifth Ave., New York 22.

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MAC
RE

SUPPLY

Jal-Con-Weld "50"
High Strength
High Performance
Low Price

ARONI PORT

Why has Jal-Con-Weld "50", the original high strength welded macaroni tubing from Jones & Laughlin Supply Division gained wide acceptance in record time?

Because Jal-Con-Weld "50" offers a 50,000 pound psi minimum yield strength, yet is priced well below conventional high strength tubing.

Call your local J&L Supply man for all your macaroni tubing requirements, or write us at Tulsa, 1439 South Sheridan Road.

Jones & Laughlin Supply Division « Tulsa

Ask your local Gates Man to show you how Super HC Drives reduce machine down-time

If you have a chain, gear, flat belt or even a conventional V-belt drive that is causing costly production down-time or high maintenance costs, your local Gates Man will be glad to help you. He will show you how these troubles can be ended by using a Gates Super HC V-Belt Drive—the first and most advanced High Capacity drive.

Because of exclusive design features, Gates Super HC V-Belts handle up to 3 times the horsepower of conventional V-belts in the same space—or they can often handle the required horsepower in about half the space. Fewer belts are needed, and sheaves can be smaller and lighter weight. As a result, bearing loads are less, increasing bearing life, reducing maintenance costs.

Gates Super HC Drive is quiet, smooth-running and entirely dependable—multiple belts assure you of continuous operation, ending costly production losses. It is a highly resilient drive that protects your machine from vibration and damaging shock loads, increasing machine life and lowering maintenance costs—savings that often amount to many times the cost of the drive.

The Gates Man located near you is a drive design expert. Contact your nearby Gates-stocked oil field supply house for his help when you have a drive problem.

BP41P

The Gates Rubber Company, Denver, Colorado

Gates

Gates Super HC V-Belt Drives

B-50-B hydrant with solid barrel

performance HIGH
operating costs LOW

Available in many types for usual and unusual services, Darling Hydrants provide that dependability, ease of operation, and minimum maintenance that keeps overall costs *low*, performance *high!*

The B-50-B design, for example, combines ball bearing operation with "O" ring seals—assures a trouble-free, easily operated, dry-top hydrant. Threads and bearings stay lubricated—water can't reach them. There's no packing gland maintenance—ever! And the B-50-B design is available in all types except the Tropical. *You can depend on* Darling Hydrants for maintenance-free, trustworthy service.

Write for Bulletin 5710 or ask a Darling engineer for proposals.

DARLING VALVE & MANUFACTURING CO.

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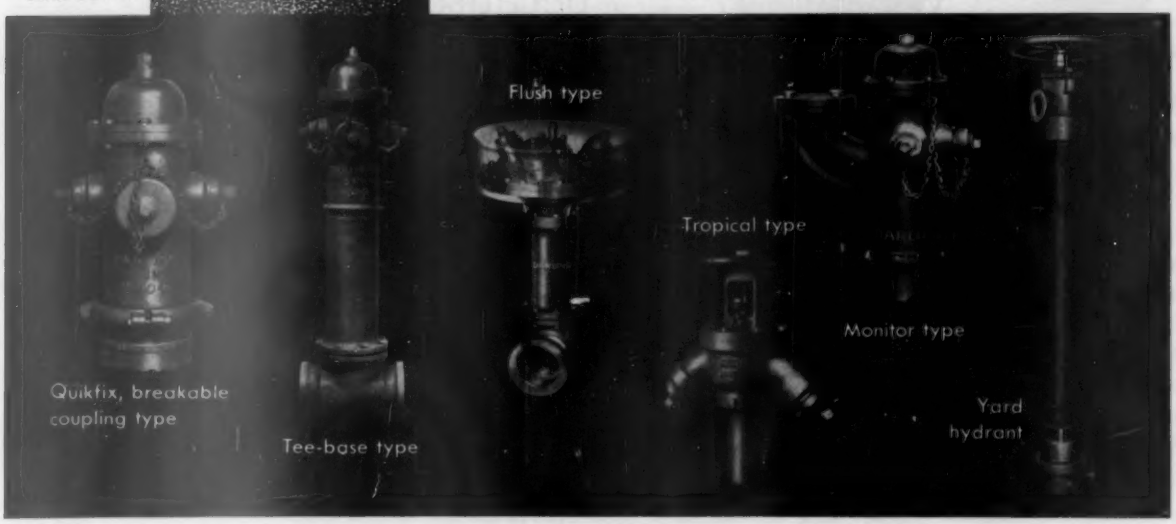
The Canada Valve & Hydrant Co., Ltd., Brantford 7, Ontario, Canada
Vannes Darling-France, 23 rue du Commandant Mouchotte, St. Mandé, France

YOU CAN DEPEND ON

DARLING

TRADE DARLING MARK

GATE • BUTTERFLY • CHECK • SPECIAL VALVES • FIRE HYDRANTS



Mission rods are here to stay

because Mission Super-Chrome rods have 2 wearing surfaces

Ordinary rods must fight corrosion fatigue as well as the fatigue from tensile and compressive stresses. But, the tough, hard-chrome plating you see in the photograph protects Mission Super-Chrome® rods against corrosion fatigue. That's one more reason Mission rods last longer. Beneath the coat of heavy chrome you can see the deep, file-hard case. Inside is the tough, high strength core. Its unusually high ductility will resist the fatigue induced by literally millions of tension and compression cycles, while the chrome plating resists the corrosion fatigue which could be induced by millions of gallons of drilling fluid. Mission Super-Chrome rods are sure to stay in your pump longer than any others. Specify Mission parts all the way and save all the way.

MISSION MANUFACTURING CO.

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Karel Wegkamp ..... District Manager

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204 Washington Square Building
Royal Oak, Mich.
Phone LIncoln 7-9455

John D. Yoder ..... District Manager

PITTSBURGH OFFICE
Law & Finance Building, 429 Fourth Avenue
Room 1050
Phone GRant 1-5847

Ernest S. Holzworth ..... District Manager

ENGLAND
67/68 Jermyn Street, St. James's,
London S.W. 1. Phone TRAfalgar 6318

Max Holsinger ..... Director International Sales Operations
A. T. Chapman-Purchas .. Group Manager

11 Tewit Well Road, Harrogate, Yorkshire

Philip King ..... Northern Manager

WEST GERMANY
Düsseldorf Huttenstrasse 17, am
Phone 10493

Ing. Georg Wilhelm Rohde—Group Mgr.

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Member
Audit Bureau of Circulations
Associated Business Publications

They Say—

Sorry, wrong number

Dear Sir:

A slight error in your May 29 edition prompts me to write you.

Regarding the article, "Iran Has 26,000-Bbl. Well," page 121, Ahwaz 7 was the relief well which was drilled to 3,602 ft. and abandoned at that depth in June, 1958, after extinguishing the Ahwaz 6 fire.

A. J. M. Harris
London.

Attention, stamp collectors!

Dear Sir:

Enclosed herewith are two sheets of 100 stamps each. These were issued by the Kingdom of Saudi Arabia and show a gas-oil separation plant.

The Arabic writing in the medallion is the name of the Saudi Arabian king.

The denominations are 1 and 2 Qirsh.

Thought you might like to frame these or pass them on to your readers who are collectors of stamps.

George D. Hartley
Abqaiq
Saudi Arabia

Thanks, Reader Hartley, for your thoughtfulness. These two issues will be sent with your compliments to the first two readers to request them.—Ed.

The manpower shortage

Dear Sir:

Your report of a shortage of derrickmen, floormen, and drillers (OGJ, May 29, p. 99) when considered with an item in the Wall Street Journal some time back reporting that many strings of tools were idle, suggests that the situation might become acute when such strings are put in operation.

Soon after the second world war, the late Joe Croom, editor of the local paper, and I arranged with the local Oklahoma State Tech College to offer a course in standard and rotary drilling if we could obtain the drilling machines.

Upon visiting and calling various

When the chips are down in the exacting business of blowout prevention, dependability and safety count most. And this rugged high-pressure valve from Demco scores highest on both counts!

The rugged construction of the Demco Valve assures its reliability—it *holds every time* against the high pressures of an unexpected flow. You get a positive rubber-to-metal seal without applying undue torque to the stem—a drop-tight seal that you can depend on.

And no matter when you need it, the Demco valve will always operate easier. Fewer parts are subject to wear. Stem threads are constantly self-lubricated and are protected from abrasives with *double* stem seal.

When you choose a valve for blowout prevention application, choose reliability, rugged construction and sure-seal safety. Choose Demco!

Available at supply stores everywhere in 1,000, 2,000, 3,000 and 5,000 psi working pressures . . . in two- to four-inch sizes.

DRILLING EQUIPMENT MANUFACTURING CO.

845 S. E. 29th Street ● OKLAHOMA CITY

DEMCO

surplus property depots and calling the sales offices of the companies manufacturing such equipment we found no such surplus equipment.

Therefore, the returning GI was afforded no opportunity to learn drilling other than on a rig in the field where the time cannot be spared for more than one student at a time.

After reading the above items, it occurred to me that some members of the industry might want to contact Mr. L. K. Covelle at Okmulgee State Tech College to learn if he would still be interested in putting in such a course if they would loan him the necessary equipment.

Although I retired some years back I would be glad to help in any way.

R. D. Pine
Okmulgee, Okla.

Fina's soft sell

Dear Sir:

In my opinion, any coverage of our efforts, if accurately reported, is most welcome. Especially appreciated, of course, is editorial attention.

This is not to say we agree with some of the conclusions reached by Henry Ralph, however (OGJ, June 12, "Journally Speaking," p. 75).

He mentioned a rather informal survey in which the general consensus was that our Pink Air campaign appeared to be a "silly way to attract attention." We have run only two ads so far and, surprisingly, have received many thousands of coupon responses and hundreds of letters or post cards either congratulating us on this approach or expressing amusement at our soft-sell technique.

So far, no complaints or derogatory remarks have been received. As you can imagine, therefore, we are even more enthusiastic about this campaign than we were before it commenced.

To state our position on several points raised in the Journally Speaking column, we **do** believe that 1. The average motorist is no longer interested in hearing about new additives and the latest "best gasoline ever" and, 2. Much oil industry advertising with its munificent promises about the perfect service available at service stations places the average operator at a great dis-

"Valves of Electric Furnace Iron—an R-P&C specialty"

"Manufacturing castings from iron melted in our own electric furnaces and to our own specifications has long been an R-P&C specialty. Recognized for their superior quality, these castings of **highly refined metal** are substantially free of impurities. Dense grain structure gives them a high resistance to corrosion, high tensile and transverse strength, plus excellent deflection characteristics. In fact, their **physical properties far exceed** the standard requirements for iron valve castings. And all of these advantages are available to you in R-P&C Electric Furnace Iron Valves at no extra cost."

Shown here is an R-P&C Gate Valve of the flanged end type. It is available in sizes from 2" to 24" in bronze trim or all-iron construction. The R-P&C Iron Valve line includes other popular types of Gate, Globe, Angle and Swing Check Valves—all made of Electric Furnace Iron.

Contact your R-P&C distributor. He can supply you promptly with any Iron Valve you need as well as gate, globe, angle and check valves in bronze, cast steel and forged steel; all in a wide range of sizes, styles and pressure classes. See him or write...

R-P&C VALVES

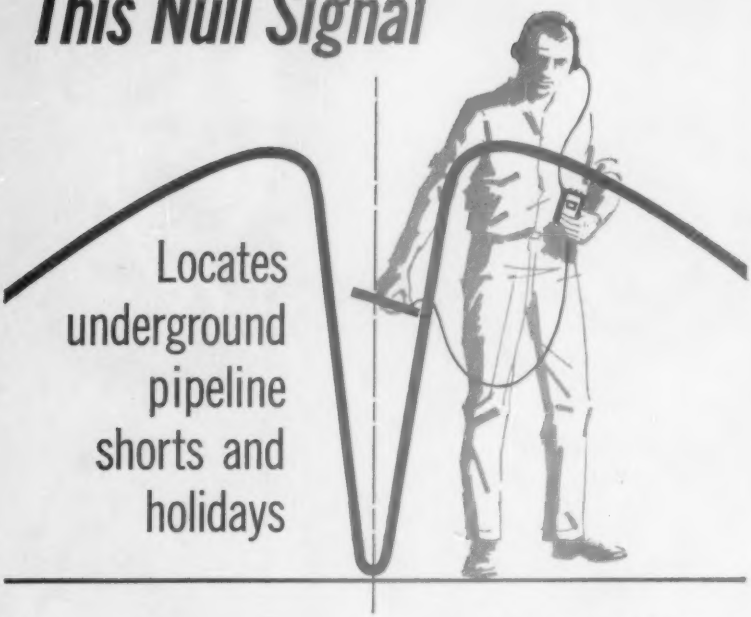
ACCO

R-P&C Valve Division, American Chain & Cable Company, Inc.

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

This Null Signal

Locates underground pipeline shorts and holidays



The null search system, teamed with Tinker and Rasor all-transistorized, Pearson-type Detectors, has greatly simplified the location of electrical shorts and holidays in underground pipe coatings. Findings are made within inches because the null is a positive factor which is either present or not present.

The Tinker and Rasor Underground Detector employs a transistorized oscillator which generates a 15 watt, 750 cycle, stable A.C. audio-frequency signal. Two 750 cycle resonate filters in the receiver reject unwanted signals. Using a low impedance search coil, one man can inspect a buried line at a rapid walk. Shorts will be indicated sharply and surely. A two man team is equally effective in locating holidays.

Tinker and Rasor has prepared a complete data kit which describes the null search system as well as other recommended procedures for inspecting protective coatings. Material includes technical data on equipment, general discussion of types of detectors, theory of operation, etc.

Engineering Note:
To insure a perfect application, include Tinker & Rasor Holiday Inspection. Write for specification guide.

Quality Control for Coating Application

TINKER & RASOR

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advantage. He no longer receives the appreciation rightfully due him for many free services offered and, most of the time gladly rendered, rather, some advertising has caused motorists to expect all of this and then some and to become most upset if it is not forthcoming.

So, in our small way, we are taking a different approach and we are going to attempt to point out that "despite occasional lapses, our service is unexcelled, our credit terms are equal to any, our products are well ahead of the equipment in which they are used, they are taxed higher than they should be, and they are sold by people just like the corner druggist—people who have payrolls to meet and help problems and wife problems and so on"—to quote from a talk I recently made on this subject.

It is our belief that such an approach, properly handled, might make us some friends or at the very least might put some portion of the motoring public in a more realistic frame of mind concerning the oil industry.

J. M. Shea, Jr.
Vice President
American Petrofina
Dallas

Case of mistaken identity

Dear Sir:

The reference to "Bradford Oil Co." in the article on tertiary recovery (OGJ, June 12, p. 86) should have been the "Bradley Producing Corp." Will you please correct this in future articles on the alcohol test?

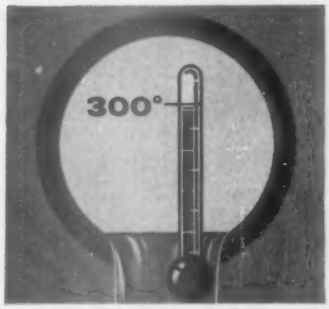
W. H. Young, Jr.
Bradley Producing Corp.
Wellsville, N. Y.

One yo-yo after another

Dear Sir:

The "Journally Speaking" on Fina's Pink Air (OGJ, June 12, p. 75) is an almost classic of well-placed derision.

When will the oil companies wake up to the fact that their weird marketing policies will always be thwarted by independent marketers whose ears are more closely attuned to the prices the public will pay to run the family chariot? It would be easy to document possibly the silliest pricing structure in any region in the United States, possibly the world



PROTECTION . . . THAT REALLY WORKS!

If you've ever had a pipe deteriorate, you know how serious it can be. Fibercast stands up where others simply won't do. Produced under a carefully controlled manufacturing process, its solid centrifugally cast walls provide positive protection against high temperatures in corrosive environments.

FIBERCAST® epoxy pipe safely handles corrosive solutions to 300° temperatures

Rugged pipe carries 94% of known corrosive solutions. Available now in sizes from 2" to 8"

Heat and corrosion failures cost money. That's why it's important to consider the maximum protection you get with Fibercast epoxy pipe. Protection against premature fouling, generally attributed to operating temperatures and corrosive solutions. Protection against intermittent replacements, downtime—added costs for new materials and labor.

Years of actual operation in field use, prove Fibercast outlasts other kinds of pipe. Even more expensive metal pipe, or pipe with thermoplastic interior coatings cannot match Fibercast's resin rich interior.

Comparative Life Data

Report after report shows that Fibercast does outperform other types of pipe in terms of long service life. Basing Fibercast Grade J at 100% as unit life, comparable ratings show: Aluminum, 26%. Brass (RED), 74%. Rubber Hose, 21%. Stainless Steel (304-40), 31.1% Asbestos (cement C-100), 23.7%.

Handles 94% of Known Corrosive Chemical Solutions

Out of 338 common corrosive solutions, Fibercast safely handles 320. Not only does it provide superior resistance to corrosion, heat and pressure—it also has the outstanding ability to maintain the purity of the solutions it carries. The pipe has a glass-smooth interior with a Hazen-Williams C-Flow Factor of 147. This cuts friction losses. Encourages flow at intended pressures. Resists deposit build-up. Dielectric properties ward off electrolytic action.

Fibercast owes its long life—and its special resistance to heat, pressure, corrosion, contamination, electrolytic action—to the exclusive way it is built. Fibercast is a centrifugally cast thermoset epoxy resin reinforced pipe with multiple layers of seamless braided glass fiber sleeving or especially woven glass fabric. Its body of woven glass fibers, impregnated with epoxy resin chemically cured at elevated temperatures provides remarkable ability to withstand high pressure and temperature in corrosive environments.

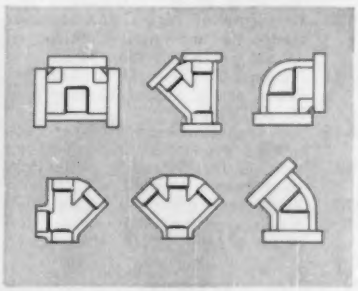
FIELD USE PROVES RESISTANCE TO CORROSION . . . 1 Plastic-coated steel nipple (right), used in salt water supply well, corroded and lost strength after 3 months. Fibercast (left), used in same installation for 3 years still shows no loss of strength.

Savings Right from the Start

Fibercast puts you way ahead for your money from time of installation. Light weight makes it easy to handle; (it is one-fourth the weight of steel). Yet it even has structural stability and strength for installation on span racks with the normal metal pipe spacing.

Complete Line of Fittings

Fibercast offers fittings to solve any fitting problem. Besides a vast stock of standard sizes and types, Fibercast also designs and makes special fitting to meet individual problems. All have the same corrosion resistance properties of Fibercast Pipe and Tubing.



Get the full story on Fibercast Pipe, Tubing and Fittings. Find out how they can help you solve and combat specific problems relating to temperature, pressure and corrosion. Mail coupon today.

FIBERCAST COMPANY, Dept. OGJ-71
Box 727, Sand Springs, Oklahoma
Please send me, without obligation, further details about Fibercast Pipe, Tubing and Fittings.

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Address _____
Title _____
Firm _____
Type of Business _____
City _____ Zone _____ State _____

FIBERCAST® COMPANY

A DIVISION OF Youngstown SHEET AND TUBE COMPANY

(even worse than France!), right here in New Mexico.

When will oil companies learn that they cannot yo-yo gasoline prices willy-nilly, just as they cannot yo-yo geologic staffs, and thus indirectly yo-yo the number of students studying geology in universities?

I place all these things in exactly the same category — stupidity. Is there any wonder that our petroleum public relations have fallen flat?

Sherman A. Wengerd
Professor of Geology
University of New Mexico

P. S. To any who perchance read this letter and be stung into action. I heartily recommend reading Paul Tabori's book "The Natural Science of Stupidity," published by the Chilton Co., Book Division, Philadelphia.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR OF EVENTS

JULY

10-21 University of Michigan, summer course on underground storage of natural gas, Ann Arbor, Mich.

23-28 National Congress of Petroleum Retailers, annual session, Cosmopolitan Hotel, Denver.

26-28 American Petroleum Institute, Division of Production, eastern district meeting, The Greenbrier, White Sulphur Springs, W. Va.

27-29 Rocky Mountain Mineral Law Foundation, seventh annual institute, University of New Mexico, Albuquerque.

AUGUST

2-4 Wyoming Geological Association, sixteenth annual field conference, Green River, Wind River, and Powder River basins.

20-22 North Dakota Oil and Gas Association, ninth annual meeting, Plainsman Hotel, Williston, N. D.

20-24 Asphalt Institute, international conference on structural design of asphalt pavements, University of Michigan, Ann Arbor.

28-30 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

28-Sept. 1 American Society of Mechanical Engineers, international heat transfer conference, Boulder, Colo.

SEPTEMBER

5-8 American Chemical Society, Chicago section, eleventh national chemical exposition, International Amphitheatre, Chicago.

7-8 Rocky Mountain Association of Ge-

B&W Specializes ONLY in Well Completion Equipment

ENGINEERED QUALITY... PRECISION PRODUCED IN EVERY B & W CENTRALIZER

From its resilient Kon-Kave Bows, to its permanent, professional welding and perfectly round, hinged or slip-on collars, every B & W centralizer is precision engineered and produced to exacting requirements. Special triple heat treating and outstanding metallurgy give every B & W model and size an extra strength and added durability that is unequaled in other centralizers.

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ologists, field conference, Salida, Monarch, Ouray, Silverton, and Durango, Colo., areas.

7-9 Magic Plains Oil Exposition, Borger, Tex.

11-15 Instrument Society of America, fall instrument-automation conference and exhibit and sixteenth annual meeting, Biltmore Hotel and Memorial Sports Arena, Los Angeles.

12-13 American Gas Association, Southern Gas Association, annual accident prevention conference, Statler Hilton Hotel, Dallas.

13-15 Pacific Coast Gas Association, convention and annual meeting, Coronado Hotel, Coronado, Calif.

13-15 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

13-15 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.

14 Natural Gasoline Association of America, Rocky Mountain regional meeting, Northern Hotel, Billings, Mont.

15-16 Kansas Geological Society, annual field conference, Mark Twain Hotel, Hannibal, Mo.

17-20 American Institute of Electrical Engineers, annual electrical conference of the petroleum industry, Jung Hotel, New Orleans.

18-19 Independent Natural Gas Association of America, annual meeting, Shamrock Hilton Hotel, Houston.

20-21 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

20-21 American Institute of Electrical Engineers, Institute of Radio Engineers, Instrument Society of America, industrial electronics symposium, Bradford Hotel, Boston.

24-27 American Institute of Chemical Engineers, national meeting, Lake Placid Club, Lake Placid, N. Y.

24-27 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Muehlebach Hotel, Kansas City.

25-27 Texas Mid-Continent Oil and Gas Association, annual meeting, Texas Hotel, Fort Worth.

25-28 American Welding Society, fall meeting, Adolphus Hotel, Dallas.

OCTOBER

1-4 American Gas Association, annual convention, Dallas.

3-4 University of Kansas, ninth annual gas measurement institute, National Guard Armory, Liberal, Kans.

4-6 American Association of Oilwell Drilling Contractors, annual meeting, Rice Hotel, Houston.

4-6 American Society of Mechanical Engineers, process-industries conference, Shamrock-Hilton Hotel, Houston.

8-11 Society of Petroleum Engineers of AIME, annual fall meeting, Memorial Auditorium, Dallas.

11-12 Western Petroleum Refiners Association, waste disposal and stream pollution conference, Hotel Lassen, Wichita.

12-13 California Natural Gasoline Association, annual fall meeting, Lafayette Hotel, Long Beach, Calif.

15-17 National Association of Oil Equipment Jobbers, annual convention and trade show, Mayflower Hotel, Washington.

15-18 American Petroleum Credit Associa-

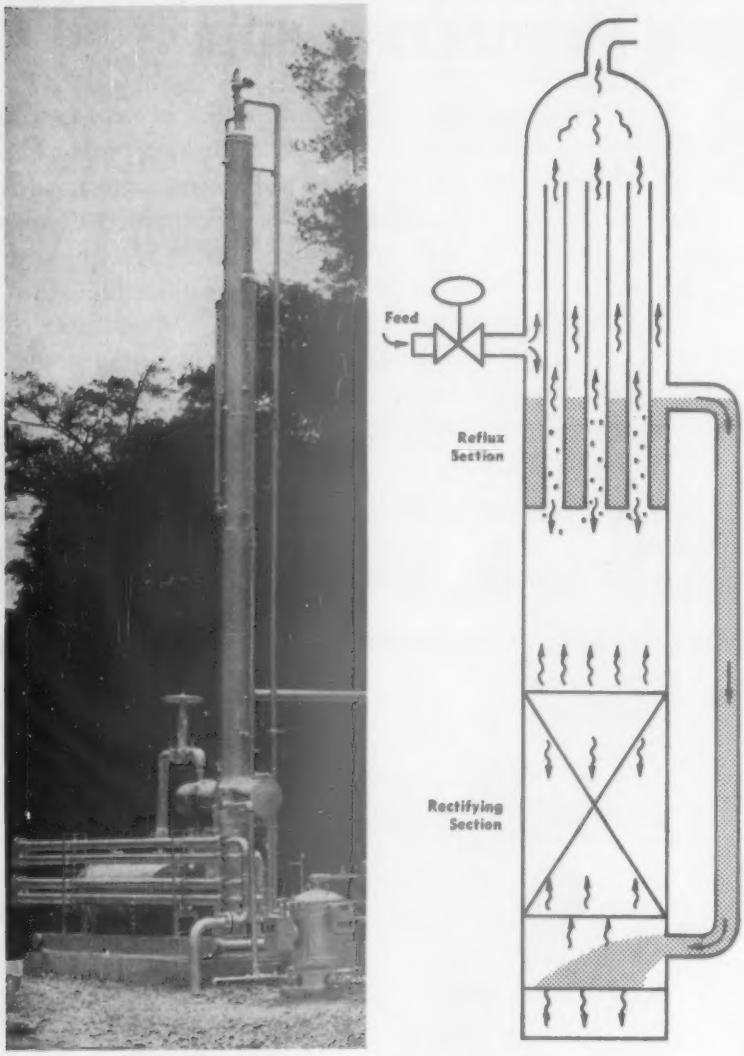
NEW BARTON 273 PNEUMATIC TRANSMITTER MEETS MORE APPLICATION REQUIREMENTS THAN ANY OTHER TRANSMITTER

The Barton 273 offers the widest differential pressure ranges (0-8″ w.c. to 0-400 psi), the highest safe working pressures (to 10,000 psi), and the widest variety of housing materials (aluminum, brass, steel, 316 stainless steel). It's compact, weighing up to less than ½ the weight of other units. It has adjustable suppression up to 80% of DP range, and adjustable span. A non-bleed relay minimizes air consumption. It doesn't shift zero on overrange. It's unaffected by normal piping stress. In every respect, the Barton 273 is the most significant advance in pneumatic transmitters in the past decade. There's a lot more you should know about it—for complete data write

BARTON

INSTRUMENT CORPORATION, 580 MONTEREY PASS ROAD, MONTEREY PARK, CALIFORNIA.

Maloney-Crawford's New Auto Reflux Stabilizer Can Increase Condensate Income Up To 25%



The Maloney-Crawford Auto-Reflux stabilizer has been field-proven to increase condensate sales up to 25 per cent even with lower operating pressures and inlet feeds as high as 85 F. M-C has broken the inlet temperature barrier with a patented feed exchange system built into the top of the column, as shown in the simplified drawing above. This unique system utilizes the throttling cooling of the feed to provide a rectification section and to reflux the column. It is especially well suited for use downstream from hydrocarbon recovery units and gas plants. Write for full details!

Maloney-Crawford

Box 659 **Tulsa**

tion, annual conference, Shamrock-Hilton Hotel, Houston.

17-19 American Society of Mechanical Engineers, American Society of Lubricating Engineers, lubrication conference, Morrison Hotel, Chicago.

18-20 Rocky Mountain Oil and Gas Association, annual convention, Denver-Hilton Hotel, Denver.

18-21 American Association of Petroleum Geologists, Mid-Continent regional meeting, Amarillo, Tex.

24-25 Pennsylvania Grade Crude Oil Association and Pennsylvania State University Mineral Industries Experiment Station, technical conference on oil recovery by solvents, Pennsylvania State University campus, University Park.

24-27 National Association of Corrosion Engineers, south-central region conference and exhibition, Shamrock Hilton Hotel, Houston.

25-26 Western Petroleum Refiners Association, annual question and answer session on refining technology, Rufus Garrett Hotel, El Dorado, Ark.

25-27 Gulf Coast Association of Geological Societies, annual meeting, Granada Hotel, San Antonio, Tex.

27 Natural Gasoline Association of America, southern regional meeting, Carlton Hotel, Tyler, Tex.

29-31 Independent Petroleum Association of America, annual meeting, Shamrock-Hilton Hotel, Houston.

29-Nov. 1 National Lubricating Grease Institute, annual meeting, Rice Hotel, Houston.

NOVEMBER

1-3 Southwest Federation of Geological Societies, annual meeting, Hilton Hotel, El Paso, Tex.

2-3 Society of Petroleum Engineers of AIME, annual California regional meeting, Hacienda Motel, Bakersfield, Calif.

2-4 Geological Society of America, annual meeting, Cincinnati, Ohio.

5-9 Society of Exploration Geophysicists, international meeting, Denver.

6-8 Chemical Institute of Canada, conference of the chemical engineering division, Royal York Hotel, Toronto.

9-10 Society of Automotive Engineers, national fuels and lubricants meeting, Shamrock-Hilton Hotel, Houston.

13-15 American Petroleum Institute, forty-first annual meeting, Conrad Hilton, Congress and Palmer House hotels, Chicago.

17 Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

26-Dec. 1 American Society of Mechanical Engineers, winter annual meeting, Statler-Hilton Hotel, New York City.

DECEMBER

3-6 American Institute of Chemical Engineers, annual meeting, New Yorker Hotel, New York City.

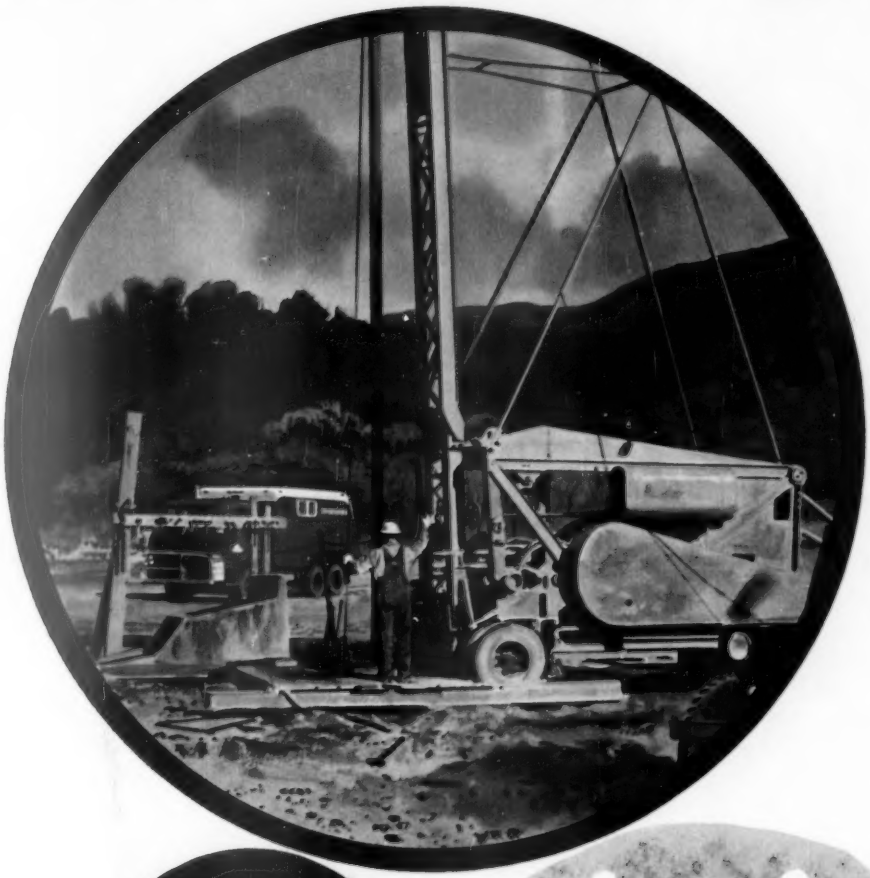
4-6 Interstate Oil Compact Commission, annual meeting, Denver Hilton Hotel, Denver.

5-6 Western Petroleum Refiners Association, computer conference for refiners, Hotel Tulsa, Tulsa.

JANUARY

8-12 Society of Automotive Engineers, annual meeting, Cobo Hall, Detroit.

16-18 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville, Ky.



empty hole logging

FOR CABLE TOOL AND GAS DRILLED HOLES

The Schlumberger empty-hole logging techniques have proved effective for both century-old cable-tool and the newer air/gas drilling.

Logging services for empty holes include the following:

Gamma Ray-Neutron
Induction
Temperature
and Gamma-Gamma Density

The recent introduction of the Gamma-Gamma Density Log—and the established interpretation know-how of Schlumberger—have led to effective formation evaluation in gas or air-filled holes.

In addition to precise formation depths and thicknesses, and to lithological identifications, the empty-hole program now makes possible the accurate determination of porosity and of fluid and gas saturations.

Consult the Schlumberger engineers in your area to determine the benefits to be derived from logging your cable-tool or gas-drilled wells.

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"...pacing the pipeline construction industry
for more than a quarter century"

price tower

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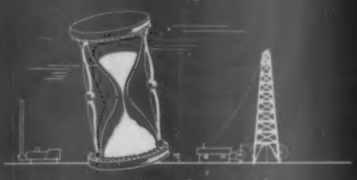


50 years ago

July 13, 1911

The rumored invasion of American oil fields on an extensive scale by the Royal Dutch-Shell syndicate is causing quite a stir among large producing and marketing firms of this country. The foreign-based oil group is expected to offer stiff competition, particularly in marketing circles.

Standard Oil Co. and Nation Oil Co. have drawn lots for the contract to supply the city of Norfolk, Va., with gasoline and kerosine. The drawing was authorized by the board of control after these companies made identical bids of 9 cents per gallon for gasoline, and 6 cents per gallon for kerosine. Contract went to Standard.

Louisiana Co. has completed its new 30-mile, 8-in. pipeline from Vivian to Ardis Junction, east of Shreveport, La., in record-breaking time of 41 days. The line had to pass under more than 100 other pipelines, in addition to several railroads and county roads.

25 years ago

July 9, 1936

Rodessa field, stretching across Caddo Parish of northwestern Louisiana and extending into Cass County, Texas, observes first anniversary of its discovery with impressive showing of 236 oil and 20 gas wells drilled, 10,098,330 bbl. of oil and 45,000 M.M.c.f. of gas produced, 4,000 to 10,000 acres proved productive, and 65 active drilling operations.

Discovery of first pre-Upper Cretaceous production in the South Arkansas-North Louisiana district starts intensive new wave of exploration. Record number of geophysical crews put into field. Phillips Petroleum Co.'s new discovery well on northeast flank of Smackover field, in Ouachita County, Arkansas, flows 208 bbl. of 50°-gravity condensate and 13 M.M.c.f.d. of gas from lime formation at 4,926 ft. believed to be of Jurassic age.

10 years ago

July 12, 1951

Quaker State Oil Refining Corp. acquires oil and gas holdings totaling 25,000 acres with 3,000 producing wells in $1,500,000 deal with Northern Ordnance, Inc., John B. Hawley, and others. Properties include 7 compressor plants, 45 houses, and miscellaneous oil-producing facilities. Transaction is largest in eastern states in many years.

Use of natural gas as circulating medium in rotary drilling proves successful in pioneering operation involving six wells in Kutz Canyon field, near Farmington, N. M.

JOURNALLY SPEAKING

Un-Standardized Oil

FIFTY YEARS AGO this spring the Supreme Court "de-Standardized" the oil industry by busting up *the* Standard Oil Co. into 34 separate oil companies which were to operate independently and compete with each other.

For a long time it seemed that those of the 34 who were entitled to use the "Standard" brand name in marketing hung on to it for dear life. But lately there appears to be a trend to drop it "with all deliberate speed" (to use a phrase from a more recent "desegregation" decision of the Supreme Court).

Only a handful of the 34 had marketed under a "Standard" trademark or had "Standard" in their corporate names (and some of these, such as Standard of Nebraska and Standard of Louisiana, have long since disappeared). These companies clung to the name religiously.

This was not so much because they were proud of some of the business methods their former parent made notorious, but because the old brand name had good acceptance with the consuming public. Looking back, it would appear that the public hated "Standard Oil" but loved "Standard" oils.

The dissolution decree gave each marketing company an "exclusive" territory. But this applied only to use of trademarks. The companies were all free to invade each other's market territories with different brand names, and most of them did so.

Today every state has at least two former "Rockefeller Standard Oil" companies competing to sell gasoline; Alaska and Hawaii have two each and all the others have from three to six. But if any of these companies tried to cross the line with a trademark including "Standard," or any corruption of it, it got slapped with an injunction suit by one of the other Standard companies.

For instance, "Esso" and "Sohio" brands have been confined to specific states. The only exception we know of is that Standard of Kentucky, which never had a refinery, asked and received a license to distribute Esso brands of lubes and other products—but not gasoline—in its five-state "exclusive" territory.

The public soon forgot that companies like Atlantic and Continental were once just as much a part of the old Trust as any of the companies retaining the Standard name, but it tended to believe that the present "Standards" are "all the same company." This makes the companies pretty mad, since they compete so bitterly, but so far as we can recall the only one that ever changed its name was Standard of New York, which became successively Socony-Vacuum, Socony-Mobil, and Mobil Oil.

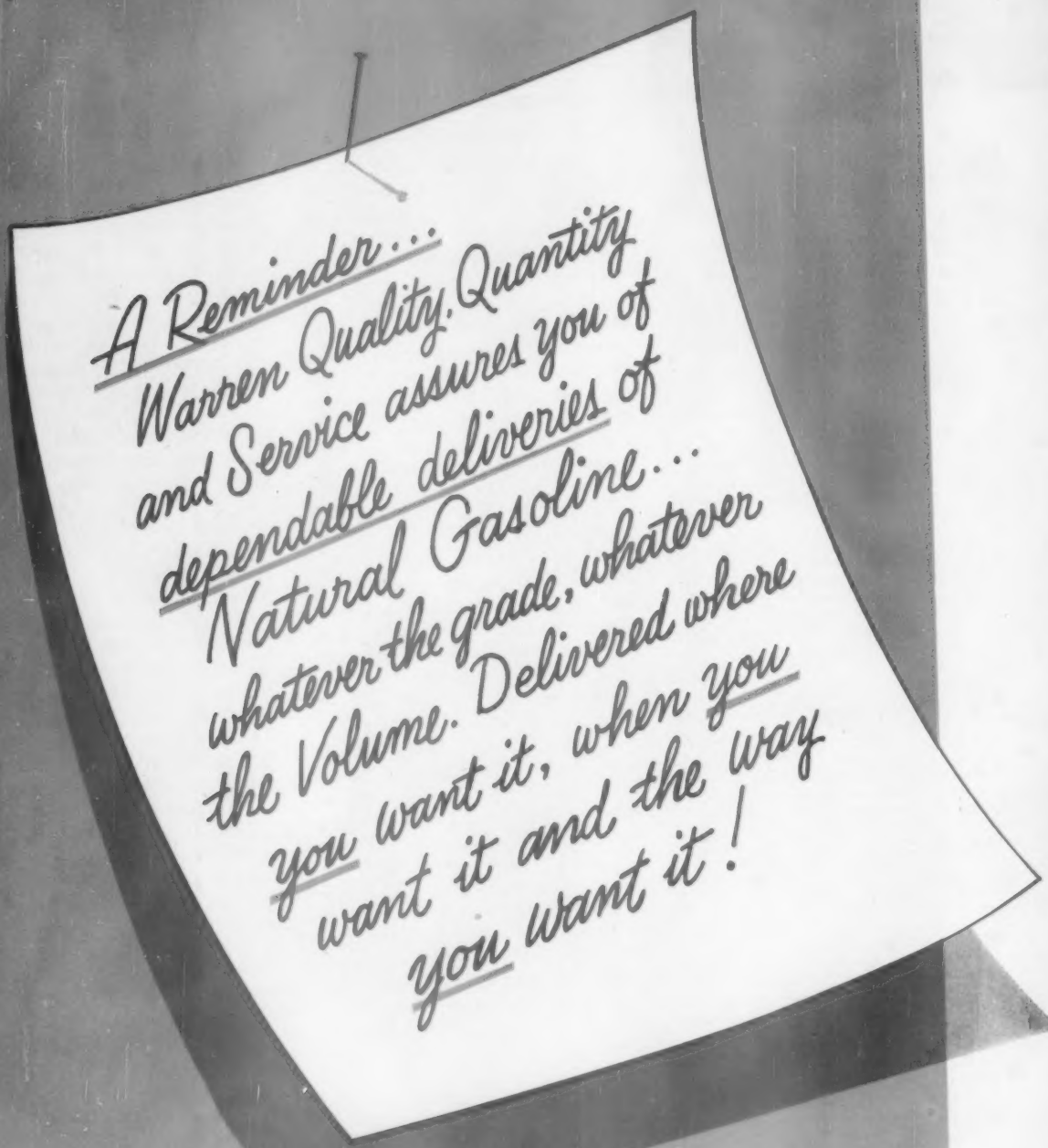
But today so many of these companies are heading for nationwide marketing that they are handicapped by brand names which are restricted to certain geographic areas. So just about every one of them now markets under an alternate brand outside (and in some cases within) its old territory.

It's going to be fun to watch Standard of Kentucky when it is merged into Standard of California, and Standard of New Jersey begins to compete in its territory. Kentucky's gasoline brand has been just plain "Standard Oil," but its other products have been "Esso." Now who gets to use what? Lawsuits have already been filed, and you can bet there'll be more.

We have absolutely no inside dope on the plans of any of the companies—and we may get hot letters from about five companies for jumping at this conclusion — but we'll venture the prediction that if the present trend to nationwide marketing continues, in a few years the companies will all standardize (small s) on non-Standard (capital S) trademarks.

Then there may still be Standard Oil companies, but no "Standard" oil.

—Henry D. Ralph.



WARREN

PETROLEUM CORPORATION

TULSA, OKLAHOMA

EXPORT TERMINALS: CORPUS CHRISTI, PORT ARTHUR, BAYTOWN, TEXAS CITY AND WARRENGAS, HOUSTON, TEXAS, SAN PEDRO, CALIF.

Canadian oil imports: How much is too much?

IF THE U. S. GOVERNMENT would propound some sort of yardstick for determining when imports of oil from Canada would be considered "excessive" it would help the industry on both sides of the border to plan for the future.

It also might forestall friction between the governments of the two countries, both of which are playing a wait-and-see game with their oil policies and diplomatically talking out of both sides of the mouth at the same time.

U. S. POLICY is to limit imports sufficiently to maintain a healthy domestic industry. But to promote continental defense, overland imports were exempted from control with the announcement that this unilateral action could be revoked if Canadian shipments become excessive.

Canada's official oil policy is to expand crude production to specific goals. By calculation, this appears to mean that within the next couple of years crude sales to the U. S. are expected to be approximately double the present rate of around 140,000 bbl. per day.

Recently the Canadians devalued their currency, one effect of which will be to stimulate crude exports to the U. S. But almost simultaneously Canada rejected a project to export large quantities of natural-gas liquids on the ground that this might strain U. S. tolerance unduly.

Similarly walking on eggs, U. S. officials have supported the overland exemption while issuing vague warnings that the "spirit" of the exemption must not be abused.

Thus Canadian policy seems to be to press exports to just short of the point where the U. S. will raise a fuss, while U. S. policy seems to be to let Canadian imports increase until it is demonstrated that they are injuring the national-defense posture of the domestic industry.

A FORMULA for determining the "peril point" of Canadian imports will be needed sooner or later, and a good time for it would be in connection with the current U. S. restudy of import controls.

A logical solution would be to require tanker-borne imports, rather than domestic production, to move over to make room for Canadian oil.

This would mean that Canadian crude would be counted as part of domestic supply when computing quotas for controlled imports (a method already followed with respect to imports on the West Coast).

However, such assurance of a market for Canada should not be absolute and unlimited. It should be accomplished by a reasonably definite yardstick for determining when our imports of Canadian hydrocarbons reach the point of impairing the defense objectives of the control program.

This might be a percentage share of the U. S. market, or a ratio to the growth of U. S. production, or something else. But the industries of both countries need a way of determining how much is too much.

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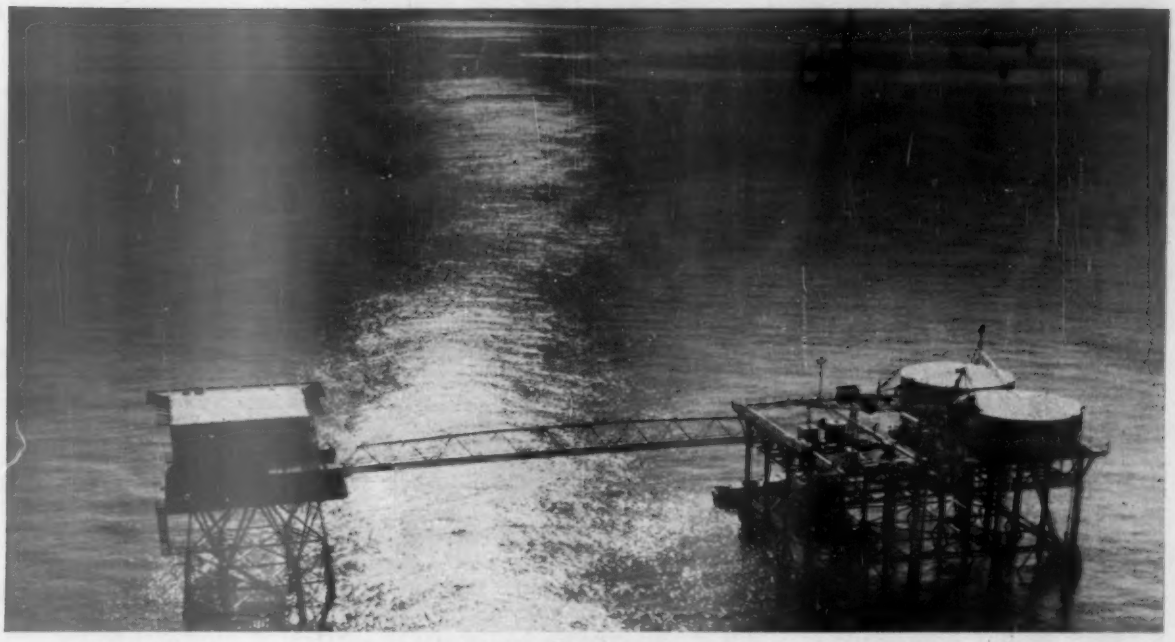


EXPANDING offshore operations will dot skylines with many more production platforms like this one off Louisiana.

Offshore—Bright Spot Grows Brighter

Ed McGhee, Drilling Editor, and
Carl J. Lawrence, West Coast Editor

FINAL TEST of an optimist is whether he's willing to support his opinion with his cash.

In some quarters of the domestic oil industry, such men are increasingly hard to find. But not in the offshore waters. There is a growing band of optimists among the offshore producers and drillers eager to lay out big sums to prove their views.

For example:

... **Construction contracts** approaching $20 million for new deep-water mobile rigs have just been announced, or soon will be, by contract drillers.

... **Producers are agitating** for a new federal sale of Louisiana tidelands—a scant 18 months after pouring out $284.5 million (double any previous sale) for new offshore acreage.

... **New leases** off California are finding ready buyers at stiff prices. Texaco, for example, recently bid $9.5 million for one 4,250-acre tract. Also, work is picking up on the old leases, and several companies are exploring the Oregon coast with seismograph and core drill.

There is concrete basis for the optimism:

... **Most offshore** drilling contractors are now solidly in the black. None feels he makes as much profit as his investment warrants, but all report financial positions vastly improved since the doldrums of 1958 and 1959.

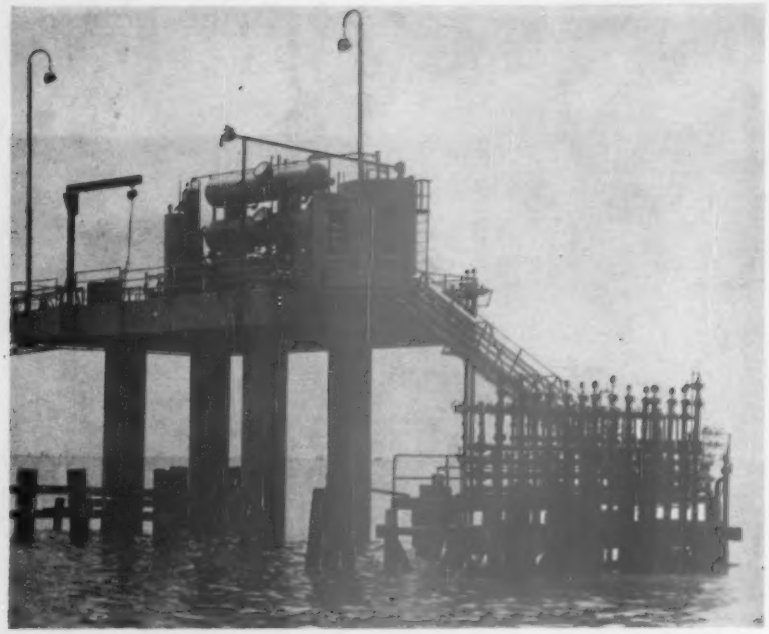
... **Offshore production** is expanding at a brisk pace. Of Louisiana's total allowable production of 1,034,000 bbl. per day for June, more than 26% (265,000 bbl.) came from offshore fields.

... **Outlook** for major discoveries is good. Two mammoth fields off Louisiana—South Pass Block 24 and Bay Marchand—are now definitely the state's largest, and both still add regularly to reserves. The law of averages, producers say, favors existence of other such "mother lodes" offshore.

Unfortunately, not all the signs point seaward. There lurks offstage a crisis which at its worst could demoralize drillers and producers operating in the Gulf of Mexico. The danger signal came from Louisiana's Conservation Commission. This group has served warning it is considering a restriction of production from multiple completed wells. It has already clamped a lid on allowables from any new completions from more than two zones.

The Commission says that a move to restrict flow from all multiples, new and old, may be necessary to keep the state's over-all production in line with market demand.

A cutback in production would come after a long series of slashes which apply equally to all wells, single and multiple alike. Many operators call the multiple completion the "lifeblood" of offshore profit. If production from multiples were severely reduced, the payout period



MORE than one-fourth of Louisiana's allowable production of 1,034,000 bbl. daily for June came from offshore fields.

for many offshore fields would be dragged out almost to infinity; many offshore rigs would go back to the dock for lack of work.

New construction revives . . . Among the visible manifestations of today's offshore optimism are the new deep-water rigs now in, or going to, the shipyards.

Kerr-McGee Oil Industries, Inc., has ordered a $7 million rig to drill in 175 ft. of water (OGJ June 19, p. 77). It will be a fixed-deck submersible unit which dwarfs any now drilling.

Ocean Drilling & Exploration Co. is currently talking with shipyards preparatory to letting contract this summer for an even more radical design. ODECO plans an L-shaped structure which would operate as a submersible barge in waters shallower than 90 ft. In deeper water, it would not submerge but drill from the floating position. Estimated cost: More than $4 million (OGJ Dec. 14, 1959, p. 44).

Global Marine Exploration Co. has committed itself for a full-floating drill ship to operate in the Gulf of Mexico. This firm pioneered floating drill ships off California and recently drilled the practice Moholes in the Pacific.

Global Marine apparently feels that there is need for floating units off Louisiana and Texas where all but a half dozen wells have been drilled from fixed platforms or submersible barges. Global Marine does not plan to build a new vessel from the keel up; instead, some existing ship probably will be converted to drilling service.

There is at least one additional, major offshore-drill barge under construction on the Gulf Coast. It is a three-legged self-elevating unit destined to drill off Africa for Offshore Co., Baton Rouge. This same firm only recently sent a similar barge to work in Central America.

From red ink to deep water . . . The Kerr-McGee, ODECO, Offshore, and Global Marine rigs are testimony to two important facts:

1. Offshore drilling contractors generally are in fair financial position; otherwise, none could finance the new barges.

2. There is a demand for rigs to drill acreage covered by waters deeper than 150 ft.

The day has past when an offshore drilling contractor could find work for a new barge even before it came off the drawing boards. Time was when the oil companies would commit themselves to keeping a rig busy for 2 or 3 years even though they had seen only blueprints for the unit. Then, the contractor could readily borrow money on the strength of work promised.

Now the oil companies want to see the finished rig before they sign a contract for it. Now, too, the drilling contractor has to find capital out of his own pocket to build an offshore rig. For the past 2 or 3 years, virtually no contractor has been willing to spend his money for such a purpose. Rate of return on offshore rigs was too low.

But rental rates on offshore rigs have risen. One oil-company executive estimates he pays at least 25% more today than he did only 2 years ago for a deep-water rig. Result is that most offshore contractors are now showing a profit for the first time since 1957.

ODECO, for instance, reported a loss of $431,000 in the fiscal period May 1959 to May 1960. In the May 1960 to May 1961 interval, the firm racked up a profit of $522,000.

Offshore Co., biggest tidelands driller of all, reported a loss of $1,413,000 in 1959. Last year, the company was in the black $321,000.

Three of the new rigs—Kermac's, ODECO's, and Global Marine's—share an important and revealing trait. All are intended for extremely deep waters. This may seem strange on the surface since the great bulk of drilling on the Gulf Coast has been in water shallower than 100 ft.

For a number of years, however, various producers have had deep-water tracts for which they paid big bonuses at past lease sales of Texas and Louisiana tidelands. Moreover, most of the California tidelands are submerged under deeper seas. There has always been a question of when, if, and how such deep-water acreage could be drilled. Now, there isn't a leased tract on the continental shelf beyond the reach of a number of mobile rigs.

It seems a certainty that the next year will bring a succession of wells drilled in record-depth water.

Underwater completions . . . Construction of deep-water barges and the advent of floating drill ships on the Gulf Coast herald the coming of another significant development: The underwater completion.

California operators have led the way in placing wellheads below the

sea surface; and two California-offshore wildcats currently making hole will be completed under water if they prove productive. Success in these two jobs should go a long way toward spreading the technique.

Both wells are drilling off Santa Barbara County on locations where the Pacific bottom is more than 200 ft. down.

Venmac III, the drill ship of Western Offshore Drilling & Exploration Co., is on location in 207 ft. of water off Coal Oil Point. It drills for Richfield Oil Corp., a pioneer in underwater-completion work. Richfield and Cities Service Co. made the first successful ocean-floor completion of a producing well in the open sea last year when their joint venture, Peruvian Pacific Petroleum Co., brought in a discovery off Peru (OGJ, Oct. 3, 1960, p. 65).

Richfield also has completed one well on the ocean floor off Santa Barbara at Rincon.

Standard Oil Co. of California and Humble Oil & Refining Co. are drilling a wildcat in the Gaviota area where they may try their underwater-completion techniques. These two companies plan to use a cantilevered mast to raise the wellhead within 100 ft. of the sea surface (OGJ, May 1, 1961, p. 59). Global Marine's CUSS I is drilling this test in 235 ft. of water.

In addition, Socal's subsidiary, California Oil Co. is preparing to test underwater-wellhead equipment and methods on a location off Louisiana. Calco made a similar test at Bay Marchand field but the well was used for water injection, not oil production.

The only other two underwater completions attempted on the Gulf Coast, so far as is known, were made by Shell Oil Co. Only one of the two was a producing well.

For the most part, the offshore producers are secretive about their underwater completion equipment. They anticipated the effect of a cheap, sound method on the competition for far-offshore leases. The company with a good underwater-completion technique would have a definite edge in bidding for acreage submerged too deeply for conventional methods.

New platform going out . . . Ironically, none of the drilling off California is from mobile platforms. Floating ships drill the wildcats; fixed platforms work in the proven areas. Drilling is also under way from two man-made islands.

Four multiwell platforms are in operation off California and another will be built this year. Those now drilling are two at Summerland for Socal and Humble, one for Texaco Inc., at Cuarta Canyon, and one for the Phillips Petroleum Co.-Pauley Petroleum, Inc., group at Conception. All are off Santa Barbara County.

Signal Oil & Gas Co. is expected to start building a 26-well platform late this year off Orange County in Huntington Beach field. Other platforms probably will be added off Santa Barbara unless the companies decide on underwater completions.

A steady procession of new platforms has been going into the Gulf of Mexico. Two of the recent structures are exploring some of the deepest water yet drilled off Louisiana. Gulf Oil Corp. recently set a new platform in 183 ft. of water; while this is an extreme depth for the Gulf of Mexico, it is well short of the 205-ft. mark chalked up by a Gulf platform of 2 years back.

The CATC group (Continental Oil Co., Atlantic Refining Co., Tidewater Oil Co., and Cities Service Co.) spudded its first well last week from a new four-pile platform in 185 ft. of water. This tender-supported structure has an extremely small deck area in order to keep cost down. Space is so precious that draw works engines are stacked one over the other instead of side by side. More than 70 miles from shore, the CATC well is the farthest offshore ever drilled.

Hungry for new leases . . . The bulk of offshore leases now in force has been held long enough for the owners to make at least a preliminary judgment on the potential.

As a result, most offshore producers would like new hunting grounds. Last federal sale in the Gulf of Mexico was February 1960. Interior Department officials indicate that no sale is planned for the remainder of 1961 but that one may be held early in 1962.

Almost all interest in the Gulf of Mexico is in the Louisiana tidelands. On the Texas side of the watery boundry, a long series of dry holes barely flecked by a few small oil finds has erased most of the early appeal. This is doubly unfortunate because the Supreme Court has cleared the way to leasing all of the Lone Star State's tidelands.

Ownership of much of submerged land off Louisiana is as uncertain as ever. Key issue is this: No one knows exactly where Louisiana's coastal swamps end and the Gulf of Mexico begins. Moreover, Louisiana officials have high hopes of getting legislation through Congress to grant the state the same 3-league seaward boundary given Texas and Florida.

No one contests Louisiana's title to the near-shore strip known as Zone 1. In fact, the state held a sale of tracts in this strip only 3 months back; the sale didn't prove much since much of the acreage had been leased previously and turned back. However, the state banked a respectable $16 million from its offering.

Drilling contractors, particularly, are hopeful for a quick settlement between Louisiana and the federal Government. The drillers want to see the Zone 2 strip put up for lease. Ownership of this strip is tied up in court action and none has been leased for several years. Immediately offshore from Zone 1 but still mostly in shallow water, Zone 2 has seen virtually no exploration recently; it is classed as some of the best prospecting acreage on the continent.

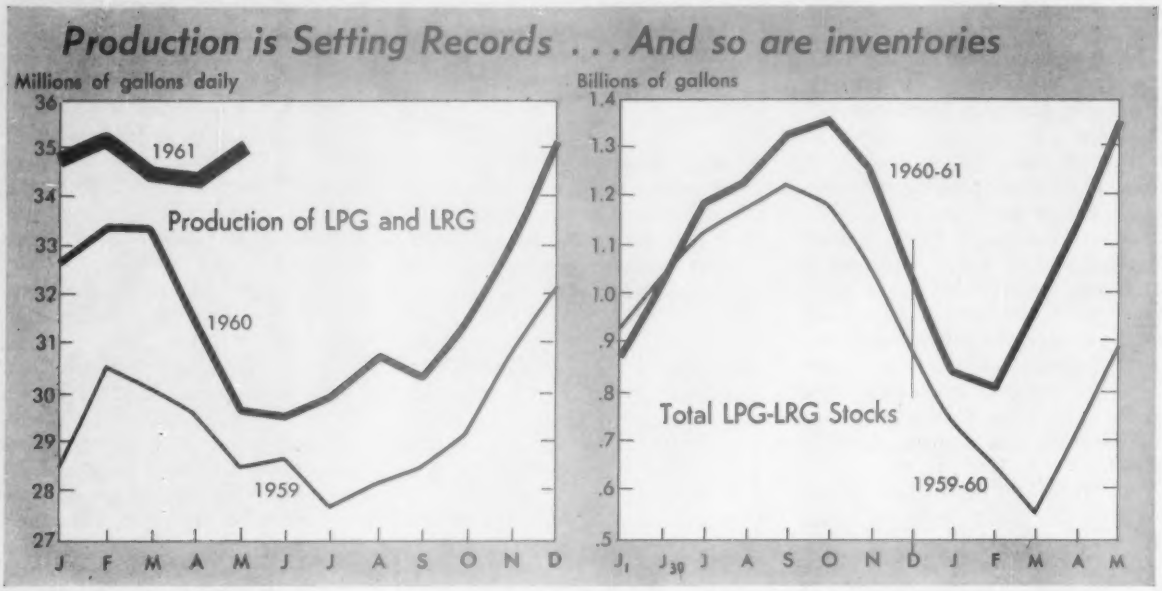
The last sale of deep-water leases brought an immediate upturn in demand (and rental prices) for larger offshore rigs. Drilling contractors believe a Zone 2 sale would be as much a shot-in-the-arm for shallower-water rigs.

The spasmodic sales of California tidelands acreage are attracting growing interest. Next parcel up for sale will be offered in September. The block adjoins one of similar size which went for $23.7 million and which subsequently has been found productive.

Offshore Section

DRILLERS and producers will be especially interested in the Journal's special section on offshore developments in this issue. It starts on page 88.

LPG Industry Faces a Tough Summer



• Prices are soft, there's too much in storage, output is unusually high for mid-summer, and it's a long time until heating season. There are logical explanations for the situation, but that's little comfort to LPG men.

LPG producers are all set for a long, cold winter. The only trouble is, they're just starting summer.

And regardless of the temperature, it's going to be a miserable period for LPG men from now until October.

Inventories hang at near record highs. Same is true for plant production. The upshot of a situation like this is the usual crumbling of prices at a time when it's still 3 months until fall demand can give the market any substantial lift.

Statistical position of the industry clearly outlines the trouble spots as:

. . . Stocks. At the start of June, inventories were reported at 1.3 billion gallons, almost equal to the amount held last October at the start of the 1960-61 season. The stocks have risen sharply from the year's low point of 813 million gallons in February.

If the trend of stock accumulation continues—and this is the time of year when stocks normally build up — inventories in October will reach 1.8 billion gallons.

The stock position at the start of June this year is by far the heaviest of record. By comparison, the industry held 888 million gallons at the same time last year, and the highest previous accumulation in June was 912 million gallons in 1959. The lowest stock position in the last 8 years was 313 million gallons held in 1954.

. . . Production. Plant operators aren't helping the situation any. They are running their plants at winter-time rates. Output in May was more than 35 million gallons daily, down only a shade from February peak production.

The production trend also isn't headed in the right direction. Normally, output drops off sharply in February or March to a low point in July. But this year a slight drop in March was followed by a levelling off in April and an actual increase in May. Unless this trend is reversed, the industry will be drowning in LPG by October.

. . . Prices. Income naturally has taken a beating under the influence of disjointed LPG supply. Prices are the lowest in 4 or 5 years and could go lower before the summer is over.

The market has sustained two price drops—in March and June—and prices generally are down by 2 to 2.5 cents a gallon. The Group 3 posted tank-car price currently is 3 cents for all grades, compared with 5 cents for propane and 5.5 cents for butane and butane-propane mix quoted last September. Posted price at Baton Rouge and Norco, La., is down from 5⅝ cents to 3⅝ cents.

But the postings actually are misleading because of drastic discounts offered to spot buyers by many suppliers. Talk in the trade is that the spot price is nearer 2 to 2.5 cents per gallon on the Gulf Coast and in Group 3, and a volume order might shave this to less than 2 cents.

Much of the LPG is moved on a contract basis, but such low prices in the spot market eventually make themselves felt in all other types of sales.

Why the oversupply? . . . Chief factor is number of new LPG ex-

Total LPG-LRG Stocks

(Thousands of gallons)

	1959	1960	1961
Jan. 1	.....	872,983	1,048,115
Jan. 31	.....	730,524	846,706
February	.....	649,442	813,819
March	.....	562,440	992,242
April	.....	710,846	1,163,567
May	912,944	888,510	1,342,802
June	1,030,829	1,024,339	.....
July	1,126,403	1,180,010	.....
August	1,174,357	1,224,780	.....
September	1,221,982	1,324,070	.....
October	1,187,996	1,348,449	.....
November	1,057,974	1,263,343	.....
December	872,983	1,048,115	.....

TOTALS AT END OF MAY
at plants, terminals, underground, refineries

1954	313,317
1955	362,628
1956	394,263
1957	791,816
1958	622,660
1959	912,944
1960	888,510
1961	1,344,802

traction plants and the heavy volumes of natural gas now available for stripping.

One industry executive observes the LPG business seems to run in cycles. A stable 4-5 cent price encourages plant construction. The resulting heavy production drops prices, and plant building then halts while demand catches up and prices revive.

This may be a partial explanation. A number of large field processing plants have been completed recently, including the King Ranch plant of Humble, and the Old Ocean facility of Pan American along the Gulf Coast, and Union Texas Natural's Payne plant and Goliad's Cow Island plant in Louisiana.

Add to these a large number of smaller stationary plants and the new portable plants becoming popular and a surge of growth in capacity is obvious.

The Oil and Gas Journal plant survey in March showed 80 new plant-expansion projects were started in 1960 and 45 were underway this year. A 7% gain in capacity is expected this year, pushing capacity to 43.85 billion cubic feet of gas daily and 47 million gallons daily of liquid production (OGJ, Mar. 20, p. 63).

New sources of LPG in the north also have affected the market for products from the Southwest and Gulf Coast. A number of refineries in St. Louis, Chicago, and Toledo areas have been putting propane extracted from crude on the market. Formerly they used the gas under their boilers but the good price encouraged them to sell the product. Propane from Canada also is moving across the border into the Minneapolis-St. Paul area by rail.

Shifts in demand trends also have helped create the oversupply.

Last winter's cold weather didn't last long enough and wasn't severe enough in the Southeast, where propane has a major market for space heating.

Chemical plants which provide a market for LPG have cut back to about 65% of capacity because of the recession.

Chemical companies also are increasing the amount of ethane used for feed stock at the expense of propane. The main reason is that they can get longer-term supply contracts on ethane than propane. At least three Gulf Coast plants have become tied to ethane as a raw material through special pipelines. Some sources estimate this trend has displaced 10,000 bbl. daily of propane on the Gulf Coast. Although this is only a fraction of the market, the amount is expected to grow.

Other trends reported which add to the oversupply: Some of the new plants take a deeper cut of propane, thus adding to their production. Refiners also need less butane for alkylation than formerly.

Corrective measures . . . Many individual companies report they are concerned at the LPG oversupply and are moving to strike a better balance.

Among the moves under study are greater use of LPG in secondary-recovery operations, more underground storage cavities to hold product for a better demand period, and a tighter rein on production where possible.

Nearly all LPG executives admit a cutback in production is needed, but they point out any drastic moves in this area are complicated by the nature of the industry. The plants often are jointly owned, which means that while one company may favor cutting back production another will not.

Operations also are geared to the flow of natural gas, and the economics of the incremental barrel work for the gas-processing plant operator just as they do for the refiner. It's more economical to get all the liquids possible from the gas. LPG producers also can't predict their demand as accurately as refiners. An oversupply now may evaporate during a long, cold winter.

Nonetheless, at least one outspoken executive said what the LPG industry now needs is "a few ounces of statesmanship."

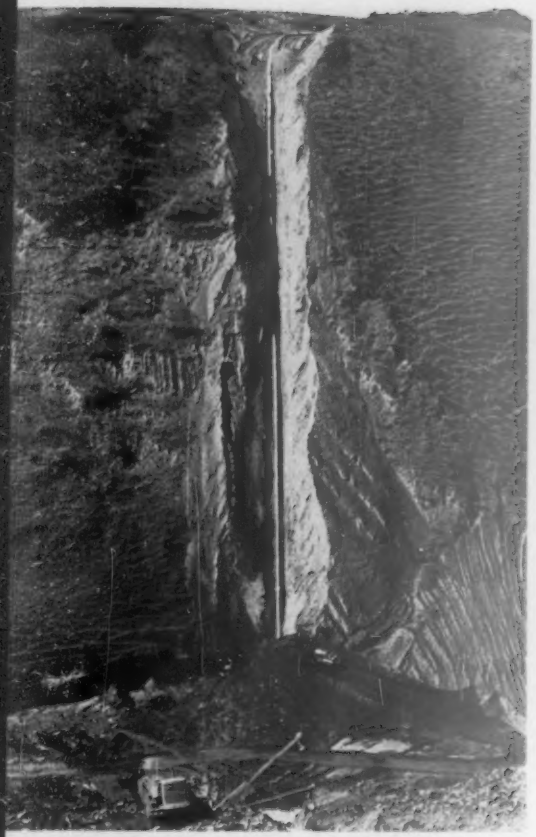
"Cutting back production is the answer. Cutting prices won't increase the use of propane to any great extent. We should throttle back production so the law of supply and demand can work," he said.

The outlook . . . The more optimistic LPG marketers say the time isn't far off now when dealers and customers will start taking fills and seasonal demand will perk up. They think winter weather will work out many of their problems.

Low prices, however, may hang on, even though they now are too low for the value of the product. Pricing will be affected by the continued overcapacity and highly competitive nature of LPG marketing which recently has seen new trends to cut distribution costs by jumbo tank cars and LPG pipelines.

The jumbo tank cars, aided by cheaper freight rates, are a move to counter the new pipelines built or building. Both presage a fight to hold and expand markets.

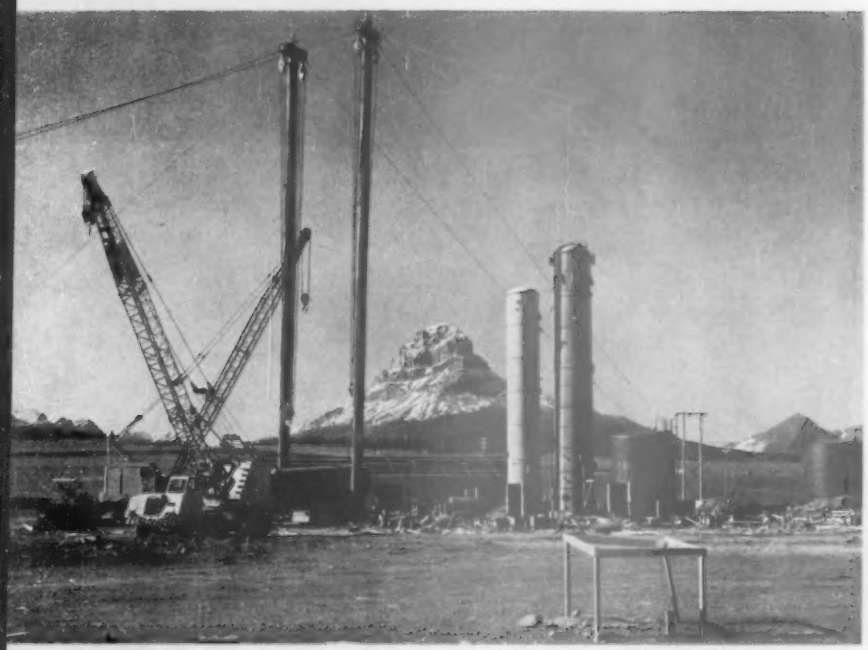
A few LPG executives point out also that underground storage is a mixed blessing as far as pricing is concerned. The growth of storage tends to level off the price peaks in winter which prevents a marketer from restoring prices from summer lows as quickly as he might in bygone days. This, however, has been offset by lowered costs of distribution and operation gained by storage near the markets and by the ability to serve the customer better.



STEEP grade at Juniper Canyon in Oregon is among natural hazards surpassed in laying 36-in. gas line from Alberta to the San Francisco area.

SCENIC but rugged Canadian Rockies and the Continental Divide are crossed near Crow's Nest Pass at Alberta-British Columbia border. This view is looking through divide into Livingston Range east of the pass.

Big Gas Line Is Yard



SEVERAL processing plants will handle the 564,000 M.c.f. of gas slated to go into the line. The Coleman plant at Savannah Creek is being constructed.

THE BIGGEST pipeline project under way today—the 36-in. gas line from Alberta to San Francisco—is more than halfway finished and going at a clip that assures completion on or before the target date of November 1.

Eleven spreads involving 3,750 pipeliners are busy along the route of the 1,400-mile line.

Here's where construction stood last week:

. . . Pacific Gas & Electric Co. section, which includes 296 miles in California, 42.3% complete.

. . . Pacific Gas Transmission Co. section in Oregon, Washington, and Idaho, 54% complete. This big section covers 611 miles, longest of any of the four sections.

. . . Alberta Natural Gas Co. section, 27% complete. This is the shortest section, running 107 miles in British Columbia from the Alberta border to the U. S. border.

. . . Alberta Gas Trunk Line Co. section, 66% completed. Work will

CROSSING the Snake River in Washington involved dynamiting ditch in the rock bed of river. Another problem in crossing Snake was railroads on both banks.

HIGH WATERS due to heavy rains and spring thaws held up construction at several points. Raging waters of the crooked Elk River west of Crow's Nest Pass temporarily delayed work.

Wide—And Going in Ground on Schedule

be finished first on this 473-mile section if it continues at the current rate.

Five spreads are working in Alberta, four on the PGT section, and one each in British Columbia and California.

Problems . . . The first 7 months of construction have not been without problems.

Heavy rains and thaws swelled streams at several points early this spring, forcing some delays. Bad weather is one of the principal reasons no more line has been laid in the short British Columbia section.

However, no bad weather is expected during the remainder of the construction, so work should move along at an even faster pace during the next 4 months.

The rugged terrain along much of the route has made the going slow at times.

The steep grade of the south wall of Juniper Canyon in Oregon forced the pipeliners to hang the 36-in. line down the wall rather than work from sideboom tractors. The double joints of 80 ft. were welded at the top of the canyon and the 600-ft. section was lowered a joint at a time.

There have been the usual rock problems along the line—but lava has presented a new engineering problem.

About 60 miles of the right-of-way just south of the Oregon border in California is covered with lava beds. On one 30-mile stretch the contractor used 700,000 lbs. of dynamite to blast out the ditch. Only a few inches of top soil covers the beds in most spots.

River crossings . . . The pipeliners moved in on some of the river crossing jobs last winter—cutting through the ice in places—to avoid high water during the spring.

The longest and deepest crossing has been completed. This is the crossing of the Pend Oreille River in Idaho, a 2,200-ft. wide stream that is 70 ft. deep.

One of the biggest crossings began last week in the delta area of the Sacramento and San Joaquin rivers near the delivery end of the line. Twin 26-in. lines will be laid in a 5-mile section of the delta area.

PG&E is principal sponsor of the $308-million system. Westcoast Transmission Co., Ltd., also is behind the project (OGJ, Aug. 29, 1960, p. 47). The line will deliver 415 million cubic feet daily to PG&E at the California border and another 151.7 million cubic feet to Spokane, Wash., for delivery to Pacific Northwest Pipeline Corp. Montana Power Corp. also is taking 30 million feet in northern Montana.

The line will tap several big fields in Alberta. Production runs from as far north as Berland River, then south through the Foothills belt to the southern part of the province.

Producers Attack FPC's New Gas Proposals

• Complaints fly over two rules that would set up gas-quality standard and affect rate of take. More kicks are likely before deadline for views.

NATURAL-GAS producers are flooding the Federal Power Commission with protests over two new rules proposed by the commission which would affect rate of take and would establish a set "quality" standard for gas.

FPC has already received dozens of comments and more are likely before the July 21 deadline the agency set for filing views on the rules (R-199 and R-200).

R-200 . . . The proposal drawing the most fire—Rule 200—provides for downward price adjustments when gas sold to a pipeline does not measure up to prescribed standards the FPC would set.

The standards include minimum criteria for quality, pressure, and delivery conditions.

The FPC apparently felt that a quality standard was necessary, particularly for use in area pricing. Otherwise, an area price would be the same for varying qualities of gas from within that area.

Producers have attacked this on several points. Sharpest criticism has been that while the FPC would put a price penalty on gas not measuring up to the standard, there is no provision for gas exceeding that standard.

Many also point out the "double-penalty" possibilities of such a rule. They say the contract price—and past FPC prices—already reflect differences in quality and other factors. Therefore, to reduce a price further on those grounds would be unfair.

Others stress that the rule is impractical because it fails to give recognition to varying factors that affect gas quality, pressure, and deliverability.

Several have used the Hugoton field as an example. Noting that the rule would establish 500-lb. pressure as one measuring stick, they say that Hugoton pressures have never been that high and that to put a price penalty on that gas would be both unwise and unfair.

"This gas has always been pipeline-quality gas," one producer wrote the FPC, "but now a ruling by you could make it inferior gas."

Other comments:

"Sellers whose wells are capable of delivering gas at pressures in excess of 500 psig., but where the buyer does not desire to take it at that pressure, could be unjustly penalized."

"Because the rule does not provide a better price for higher-grade gas, it will tend to force superior gas into nonjurisdictional markets."

"The price adjustment provided for will drastically reduce the price in the older and lower-priced areas."

"Applicability of the provision will in most instances occur in the late years of a field's life when a producer's well is already becoming marginal."

"Fixed standards are impractical due to varying conditions."

Other provisions of Rule 200 also have been attacked, including one which would tend to force producers to build their own gathering systems.

"Compelling the independent producer to deliver his gas to a central point in the field is contrary to historical practices and customs of the industry and will only add to chaos and confusion," one producer says.

Another argues that Rule 200 would tend to force interstate pipelines out of the business of extracting hydrocarbons from gas, because it would prohibit pipeline purchasers from paying the independent producers for the liquefiable hydrocarbons in the gas stream.

Rule 199 . . . The most common complaint about this proposed rule is that it would stretch a producer's payout over a longer period of years.

Several producers say the provision that the daily contract quantity shall not be greater than 1 thousand cubic feet for each 8 million cubic feet of originally dedicated reserves makes it necessary for the producer to operate for a longer period.

They say this would be particularly hard on small producers who depend on a higher rate of take in the early years of a contract to provide funds for further exploration and development.

All in all, most producers appear to feel that the worst aspect of both rules is the indication of a further tendency by the commission to dictate every term of a producer-pipeline company contract.

"The commission would spell out every single point which is a major subject of negotiation between producers and purchasers," one producer says.

"The phrase 'arms-length bargaining' is becoming obsolete," another says bitterly, "because there is nothing left to bargain over."

The FPC has not indicated when it plans to decide on the rules.

Ontario Plant to Raise Crude Demand

A MAJOR boost in demand for western Canadian crudes will be realized in 1963 when Shell Oil Co. of Canada, Ltd. completes a 31,000-bbl. refinery at the Bronte, Ontario plant site it acquired 5 years ago.

Shell currently is supplying its Ontario markets west of the Ottawa Valley from its 60,000-bbl. Montreal East refinery, using imported crude oils.

The new refinery—near Toronto—will take over these markets. Net result will be a 31,000-bbl. increased demand for Canadian crudes when the plant is operating at capacity.

Details of the plant have not been announced. However, equipment to be installed includes distillation, flashing, catalytic cracking, reforming, and hydrodesulfurization facilities.

Contractor for the project is to be announced, with construction to start later this year.

Particular attention will be paid to the design of process units aimed at preventing air and water pollution. Due to process research and

design refinements, less than half the cooling water required for a conventional refinery of comparable size will be needed at Bronte.

In announcing the plant, Shell said: "This development, plus Shell's increased crude-oil exports, should aid significantly the petroleum industry's efforts to achieve the national oil policy's 1963 production target for Canadian crude oil of 800,000 bbl. daily."

Crude supplies for the new refinery will be delivered via the Interprovincial pipeline.

New Alaskan Gas Field Runs Up Against Same Old Marketing Problem

ALASKA has another gas discovery.

Standard Oil Co. of California and Richfield Oil Corp. have completed their 1 Falls Creek wildcat as a small gas discovery on the west coast of Kenai Peninsula. But the operators have the same problem facing two other Alaskan producers—where do you find a market for Alaskan gas?

The last three successful wildcats in Alaska—if you call finding gas in Alaska a success—have been gas producers.

The Falls Creek well is about 50 miles south of Kenai gas field where Union Oil Co. and Ohio Oil Co. have developed reserves in the range of 3 to 5 trillion cubic feet. The companies drilled five consecutive gas producers, then stopped drilling. They have more gas than market.

The latest discovery flowed 1,950 M.c.f.d. from 7,600 ft. Total depth was 13,795 ft., but the bottom of the hole was dry. The wildcat was whipstocked from an onshore location in Section 6-1n-12w out under Cook Inlet.

Standard of Cal, operator at Falls Creek, has announced no additional drilling plans for the area. But this comes as no surprise. Halbouty Alaska Oil Co. still hasn't drilled a confirmation well at its gas discovery, and it was completed 10 months ago.

This well, Halasko 1-B, was completed for an open flow gage of 80 million cubic feet daily (OGJ, Oct. 3, 1960, p. 70).

Watching WASHINGTON

Clyde La Motte

- **Committees shape up final congressional actions . . .**

A MID-YEAR look at the congressional scene:

The rash of committee hearings is at its peak as Congress starts hoping for adjournment around Labor Day or shortly thereafter. Concentration is on remaining major legislation. Less important or highly controversial bills will be brushed aside where possible.

There is little legislation in sight that applies specifically to the oil and gas industry. A decision will be made shortly on the Senate resolution calling for a fuels study. Other proposals having some impact on the industry, such as those dealing with water pollution, wilderness preservation and offshore gunnery ranges, are well advanced in the congressional hopper.

There may be some stir over natural gas legislation, but this is likely to be preliminary sparring to set the stage for definite action later.

Too, before Congress quits, an attempt will probably be made in the Senate to tack a depletion-cutting rider on some House-passed revenue bill. But no all-out effort looms.

There will be an important report by the House Ways and Means Committee soon on general tax proposals. The committee will revise sharply most of the proposals made by President Kennedy, but will offer some type of incentive for plant expansion. A withholding tax on dividends is also a good bet.

- **Now a consent settlement really isn't a settlement . . .**

NOTE that the Justice Department has put into effect a rule requiring that all proposed consent judgments in antitrust cases be made public at least 30 days before they are entered in court.

In the past, in civil antitrust suits, the Government and company attorneys could work out the terms of a settlement and submit them to the court. The court would then issue a decree binding both parties to the terms of the settlement. The terms were not made public until the court order was issued.

Now, however, there will be a 30-day open season in which anyone, including a competing firm, can take pot shots at the proposed settlement—with the Government reserving the right to change the terms.

As a result, companies are likely to become exceedingly wary of agreeing to consent settlements.

- **Even the "easy" offshore problems prove difficult . . .**

SLOWLY, but inevitably, a showdown is approaching in the long-standing dispute over the Louisiana-U. S. offshore boundaries.

The long-range problem, of course, is determination of a starting line for measuring the submerged lands.

The immediate problem is amending the working agreement between the Louisiana and the U. S. so some of the money now being held in escrow can be distributed to the state or the federal Government, or both.

At first it didn't seem there would be much of a problem in this. All that appeared necessary was to change the existing zone system to reflect the court's ruling that Louisiana was entitled to only 3 geographic miles instead of 3 leagues.

Simple or not, nothing has yet been worked out between the two parties. One of these days, someone is going to have to make a legal move to force a showdown.

Crew-Months of Geophysical Exploration Around the World

	U.S.A.			CANADA			W. HEMISPHERE			E. HEMISPHERE			FREE WORLD		
	1959	1960	% Change	1959	1960	% Change	1959	1960	% Change	1959	1960	% Change	1959	1960	% Change
Seismic	5,097	4,625	−9.3	796	667	−16.2	6,988	6,188	−11.4	2,735	2,725	− 0.4	9,723	8,913	− 8.3
Gravity	548	528	−3.6	41	19	−53.7	972	807	−17.0	517	564	+ 9.1	1,489	1,371	− 7.9
Magnetic	51	54	+5.9	1	0	−100	52	78	+50.0	109	88	−19.3	161	166	+ 3.1
Other				3		−100	3		−100	105	76	−27.6	108	76	−29.6
Total	**5,696**	**5,207**	**−8.6**	**841**	**686**	**−18.4**	**8,015**	**7,073**	**−11.8**	**3,466**	**3,453**	**−0.4**	**11,481**	**10,526**	**−8.3**

Geophysical Work Off Again in 1960

GEOPHYSICAL exploration in the free world registered its fourth consecutive decline in 1960.

Activity was 8.3% below the 1959 level and 22.8% below the peak year of 1956. The year saw a total of 10,526 crew-months of geophysical exploration throughout the free world.

As activity slowed at home, there were enough increases abroad to change the pattern. The Western Hemisphere slipped from 69.8% to 67.2% of the free-world total.

Africa was the principal factor here. With determined oil-finding efforts going in in several countries, Africa moved ahead of Europe and South America to wind up second—behind the United States—as the most active exploration area.

These are the highlights of the annual report of the Society of Exploration Geophysicists. Richard H. Rainey, of Geophysical Services, Inc., Dallas, is chairman of the Committee on Geophysical Activity, which made the study.

A look at methods . . . Seismic work, the bulk of exploration activity, dropped 8.3%.

The pattern remained the same, with the U. S. accounting for more than half of the world total, followed by Africa, Europe, South America, and Canada. But the Eastern Hemisphere increased its portion of the total—going from 28.1 to 30.6%.

The only method to show a sharp increase was the airborne magnetometer, up 68% from 1959. The greatest number of miles, 179,060, were flown in the U. S., but Africa was close behind with 151,000.

Ground magnetometer activity showed a slight increase—3.1%—due mostly to gains in the U. S., South America, and Europe.

Gravimeter exploration increased 9.1% in the Eastern Hemisphere and was off 17% in the Western Hemisphere. Again the Western Hemisphere's share was going down—falling from 65.3% in 1959 to 58.9% last year.

Domestic picture . . . U. .S seismic crews were fairly busy early in 1960. There was a cutback in March and a sharp drop in December which left 359 crews in the field—lowest level since 1946 in the U. S.

Texas and Louisiana accounted for more than half of total U. S. seismic activity. Considerable work also was done in the West.

Total offshore U. S. seismic operations climbed to 93 crew-months last year, compared with 66 in 1959. Louisiana set the pace with 64 crew-months.

Gravimeter exploration held about steady in the U. S. and ended the year with 42 active crews. Most work was done in Texas, but Michigan and Utah jumped into second and third place in gravity activity.

Russians active . . . While figures on Russia and the satellite countries

are not included in the survey totals, the committee noted that the soviets are increasing their efforts.

"Recent information," the committee said, "indicates only that the levels of geophysical activity continued to expand.

"The published statement of a prominent Russian scientist in May 1960 indicated that there were 400 seismic crews prospecting for oil and gas in the Soviet Union and that the number would be increased to 1,200 by 1965."

Other areas . . . Canada, like the United States, saw more of the zip taken out of its exploration effort.

There was a combined reduction of 18.4% seismic, gravity, and ground magnetic crew-months. Alberta, as expected, had the most seismic work — 451 crew-months. British Columbia had 120, followed by Saskatchewan and the Northwest Territories with 45 each.

Elsewhere around the free world, this was the picture:

. . . Mexico. Seismic and gravity exploration, which had been steady 3 years, were down a combined 6.1%, with contractors getting less business.

. . . Central America-West Indies. Seismic work fell 49%—only 27 crew-months reported. British Honduras was the most active.

Shell Drills Marginal Gasser off Texas

SHELL Oil Co. has brought in a marginal gas well on a $2.8-million federal lease off Texas.

Offshore Texas has been a disappointment to drillers in the past. Production has been found in only two blocks in federal waters.

The new gasser is located in Block 160, owned by Phillips Petroleum Co. The drilling was a joint venture by Shell and Phillips.

The well was drilled to 12,889 ft. and was completed at 8,444-69 ft. It flowed 4 million cubic feet daily with a flowing tubing pressure of 2,940 psi. Condensate averaged 5 bbl. and water 35 bbl. per million cubic feet.

The well was drilled in 50 ft. of water about 30 miles east of Galveston.

Pending further development in the area, Shell has shut in the discovery, which cost more than $800,000 to drill.

The Vinegarroon, Zapata Drilling Co.'s offshore rig which drilled the well, has moved 1.5 miles to the east to drill on Shell's expensive Block 161.

The other production found in federal waters off Texas is located in Blocks 52 and 140, both held by Standard Oil Co. of Texas.

. . . South America. Combined activity fell 22%. Argentina, Brazil, and Bolivia were the most active. Surinam and Chile showed small increases. As in Mexico, contract companies lost business while government-operated crews and others did more.

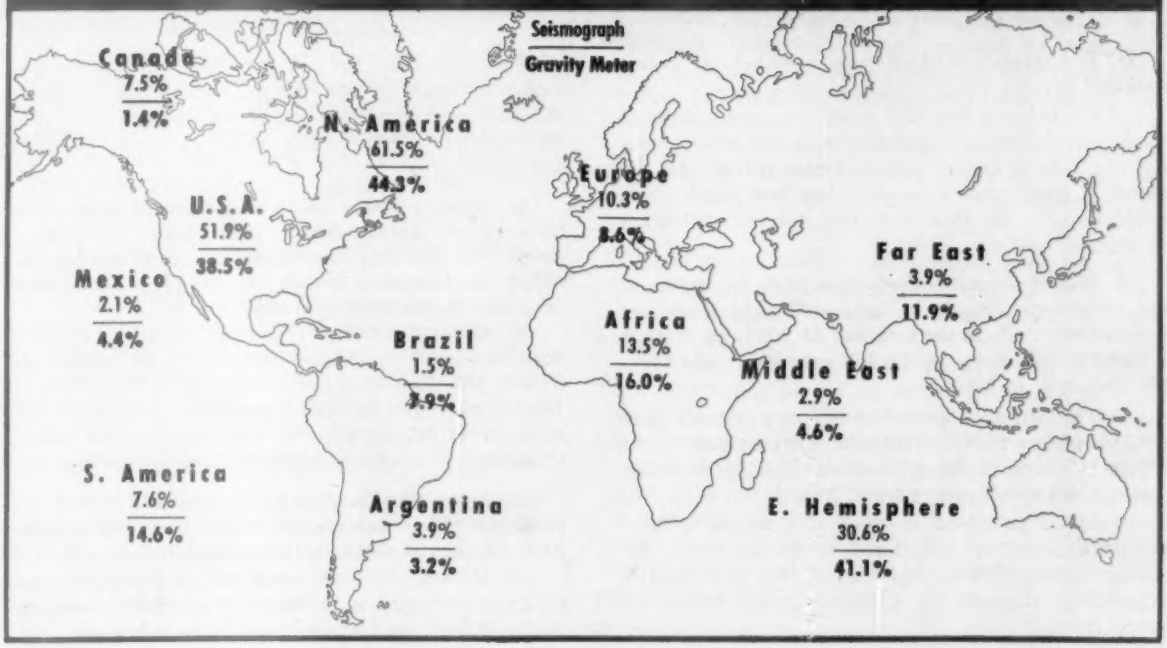
. . . Europe. Gravity, ground magnetic, and airborne-magnetometer activity was up, but seismic exploration declined.

. . . Africa. Libya had 40% of the seismic activity. Spanish Sahara, Nigeria, Egypt, and Gabon had sharp increases. Algerian seismic crew-months dropped 78 to 253.

. . . Middle East. Cutbacks in Iran, Saudi Arabia, Turkey, Syria, and Oman were mostly responsible for a net loss of 158 crew-months. Exploration was moving ahead in Iran, Jordan, Kuwait, the Neutral Zone, and Trucial Coast.

. . . Far East. A boom in Australian exploration, plus gains in India and the Philippines offset declines in other countries and gave the Far East a net increase of 12 seismic crew-months. But reductions in gravity and ground-magnetic work caused an overall 5.5% decline.

How Seismic and Gravity Work Was Distributed in 1960



Canada's Oil Policy—How Some

• Is the Voluntary Program Working?

• Does It Have Wide Industry Support?

THESE VITAL ISSUES and others are discussed by three officials of Imperial Oil Ltd., Canada's leading oil firm, in a composite-answer interview with Gene T. Kinney, the Journal's East Coast editor. W. O. Twaits is president of the company; J. A. Cogan and J. A. Armstrong are vice presidents.

W. O. Twaits

J. A. Armstrong

J. A. Cogan

Q. Is Canada's voluntary national oil policy working?

A. Considering that the goals were announced as recently as February 1, and that there was no opportunity to rearrange supply and marketing patterns for the winter, a good deal of progress has been made. You would have to say that as of this date the voluntary program is working.

Q. Will the specific production goals for crude oil and natural-gas liquids be achieved? (The goals are 625,000 bbl. daily in the first half of 1961, an average of 640,000 bbl. daily for the full year 1961, and 800,000 bbl. daily in 1963.)

A. The first half target has of course already been met. It appears that the full year 1961 and the 1963 targets will at least be approached, barring unforseen events which would alter present trends.

It should be borne in mind that targets of this type should not be considered to be too rigid. An Ontario refinery shutdown during the first quarter reduced the demand for Canadian crude below expected levels.

This points up the fact that you cannot force demand by decree. You cannot control the weather. Weather and general business conditions will have an important effect on the industry's ability to meet the goals.

Q. Exports from Canada to the United States have risen rather sharply during 1961. Some U. S. producers feel that they are bearing the entire burden enabling the Canadian industry to comply with its own oil policy. Is this criticism valid?

A. Exports the first 6 months of this year have been estimated at 155,000 bbl. daily, an increase of 37,000 bbl. daily over the average for the first half of 1960. This is not an unreasonable increase, especially as most of it has been in the Puget Sound where Canadian crude merely displaces other foreign supplies.

Q. Is the oil policy fair to all concerned? The U. S. producer? The Canadian producer? The Montreal refiner who has no Ontario refining capacity?

A. If there had to be a national oil policy, the one that was instituted is as fair as is possible to all segments of both the Canadian and U. S. industries.

Executives See It

Q. How will the goals be met?

A. In total context what the government is trying to achieve is an increase in demand of about 250,000 bbl. daily, split about half domestic and half export, over the next 3 years. Of the domestic portion, half will be growth, half reversal of supply lines in Ontario (to back out direct foreign imports and transfers of products from Montreal-refined foreign crude).

Imports will continue to serve all of Ontario east of the Ottawa Valley, and will continue as the source of some distillate, heavy fuel, and specialty products to the extent that Ontario refiners processing Canadian crude cannot produce these products in a balanced operation.

Q. The U. S. producer can see little that is being done to shift supply lines in Ontario to increase the consumption of Canadian crude. He can see that exports to the U. S. have spurted. Is anything being done in Ontario?

A. In the intervening period between now and the end of 1963, several shifts will be made in Ontario. Marketers who now rely on non-Canadian sources to supply customers west of the Ottawa Valley will have to build refining capacity in the province or otherwise make arrangements for domestic supplies.

Until then, exchanges and processing arrangements will be necessary, and are being made. These internal changes are inconspicuous as compared with exports which show up immediately in provincial crude-oil nominations.

And yet the internal changes, though invisible to the extent that they have not shown up in industry statistics, are as important as export growth.

Q. Will the direct imports and product transfers from Montreal into Ontario west of the Ottawa Valley decrease substantially this year?

A. Both direct imports and transfers should decline this year. The National Energy Board (advisers to Trade Minister George Hees, who issued the oil-policy decree) is pursuing the reversal of Ontario supply lines as a top priority item. Efforts by most of those concerned are being pushed with utmost vigor.

Q. How much will imports and transfers decline this year?

A. That's hard to tell. The short-run statistics are not a reliable barometer of what is being accomplished. The curb on the flow of foreign supplies into Ontario will be greater at the end of the year than the full-year average will show. You cannot look at targets as of a given date and measure performance. The important thing is what is going on.

Q. Under the oil policy, companies are required to file monthly statistical reports with the National Energy Board. When the day of reckoning comes at year's end, will the board be satisfied with the industry's adjustments in Ontario?

A. It is not fair to expect the industry to achieve one-third of the 3-year gain in demand for Canadian crude in Ontario in the first year, or actually a fraction of a year. One of the major changes implicit in the policy is the rearrangement of operations of Trans-Northern Pipe Line (a 400-mile 10-in. line which transports products westward from Montreal to Toronto, with a spur to Ottawa, and between Hamilton and Toronto).

Under the oil policy, most of the westward flow from Montreal will have to stop at the Ottawa Valley, except perhaps for some distillate movement in winter to met the seasonal deficit. The gap between there and Toronto must be served from Ontario refineries.

Q. Is the partial reversal of Trans-Northern feasible?

A. Our company is not a shipper in this pipeline (owned by Shell, Texaco, and British American, and used also by British Petroleum and Canadian Petrofina). However, we assume that its operations can be altered to accommodate the new circumstances, although the changes will impose economic penalties on the companies involved and cannot be made overnight.

Q. Does this mean that western Canada producers can expect little more of the Ontario market in the near future?

A. No. Much depends on growth in the existing market, but definite steps are being taken to give the western producer a larger market in Ontario. The importance of complying, beginning as soon as possible, is fully recognized by industry.

Q. Back to the reaction of the National Energy Board and Trade Minister Hees—will the indicated 1961 results satisfy them?

A. If they look at what is being done, at the trend in supply lines rather than at statistics, they can see that progress is being made and compliance is under way.

Q. Will the progress be sufficient to avoid the threatened alternative—imports controls in Montreal and a government-backed crude pipeline from Edmonton to Montreal, turning over this market to Canadian producers?

A. It is up to the government to make this judgment, but we believe they have reason to be pleased with the result that their policy has brought about very quickly.

Q. Is the oil policy, with as much emphasis as it places on increasing exports to the U. S., within the spirit of Canada's exemption from U. S. imports controls?

A. Canada has access to a refining market of about 1,250,000 bbl. daily in the northern United States, through existing pipelines or minor extensions to them, from the Puget Sound to Buffalo, N. Y. A 10% increase in demand in this market over the next 3 years would be equivalent to the growth in export that Canada contemplates—125,000 bbl. daily. The export program anticipates serving the increased demand from Canadian sources, thus avoiding any actual displacement of U. S. production.

Q. There has been some concern at the rate of

increase in exports this year. There is suspicion in the producing industry—and perhaps in Washington—as to the true intentions of the Canadian industry.

A. Canada recognizes the need for an orderly increase in exports. Still, it should be remembered that actual sales must come in fits and starts. The National Energy Board is not pushing exports blindly.

Twaits

It recognizes that if export expansion is not done carefully and with moderation, the program will defeat itself. It is certainly not in our interests—and thus is not our intention — to provoke a change in Canada's exemption from imports controls.

Q. Could the export program thus far be called one of moderation?

A. There is trouble and misunderstanding in the United States every time a new export movement starts, because talk is generated all out of proportion.

(New export markets opened since last fall in the Detroit-Toledo and Buffalo refining areas are now receiving about 30,000 bbl. daily of Canadian crude.)

Actually, considerable restraint has been exercised by Canadian exporters and their U. S. purchasers.

Q. Secretary of Interior Stewart Udall has cautioned against a sudden incursion in a single U. S. market that would disrupt existing domestic supply arrangements. Is this likely to happen?

A. Canada has no intention of going counter to Mr. Udall's expressed wishes. Most of the misunderstanding over Canadian export intentions can be traced to talk of entering Chicago. The Chicago market is not necessary to fulfill the oil-policy goals.

Q. Farther down the road, will Canadian crude come into Chicago?

A. Probably so. But in setting oil-policy goals, Chicago was never contemplated and is not needed in the near future. To attain the modest growth that is being proposed, you don't need a large movement anywhere except the Puget Sound.

Q. What about 5 or 10 years hence?

A. Every refiner in the Great Lakes area in the next several years will likely consider Canada as a source of supply. Chicago is ultimately a place where Canadian crude or its equivalent will be needed.

Q. Is Chicago the logical market for large volumes of natural-gas liquids in the near future?

A. Talk of natural-gas liquids moving into Chicago in large volumes through an entirely new pipeline is premature. The increase in natural-gas liquids production for the time being must be absorbed in existing markets—both Canadian and U. S., but primarily Canadian.

Q. Is there a demand for increased volumes of natural-gas liquids in Canada?

A. A considerable volume of such liquids is used in Canada now, and there is room for much more.

Q. Long-range forecasts of natural-gas exports to the U. S. indicate that large volumes of natural-gas liquids will be produced sooner or later substantially in excess of Canadian demand. How can they be marketed?

A. The growth of natural-gas liquids will not break out suddenly to a volume of 75,000 bbl. daily (when several gas-processing plants go on stream this fall in Alberta in connection with large-scale U. S. natural-gas export projects).

It will grow gradually. When the time comes that it must move to a big market (such as Chicago), it remains to be seen whether a new pipeline or present facilities can most economically do the job. The logical means of moving natural-gas liquids from Alberta to market is to use existing facilities because the natural markets are already connected.

Q. Another cause for concern that Canadian exports would displace U. S. production has been the opening of the Buffalo market. Is this concern justified?

Cogan

A. Interprovincial Pipe Line is seeking permission to extend its pipeline to Buffalo, the extension to have a delivery capacity of only 10,000 bbl. daily. No pumping capacity is requested in the initial application.

It is true that the proposed 12-in. pipeline, fully powered, could transport much more than the ordinary capacity—up to 60,000 bbl. daily, equal to the entire Buffalo refinery market. But a movement of that volume is certainly not contemplated in the near future. Washington has been so assured by the refiners involved and by the Canadian Government.

Installing a larger diameter line than is necessary initially is the economically sensible course to follow for the long term, even though its potential capacity won't be realized for some time.

Q. No major Canadian raid is planned on Buffalo?

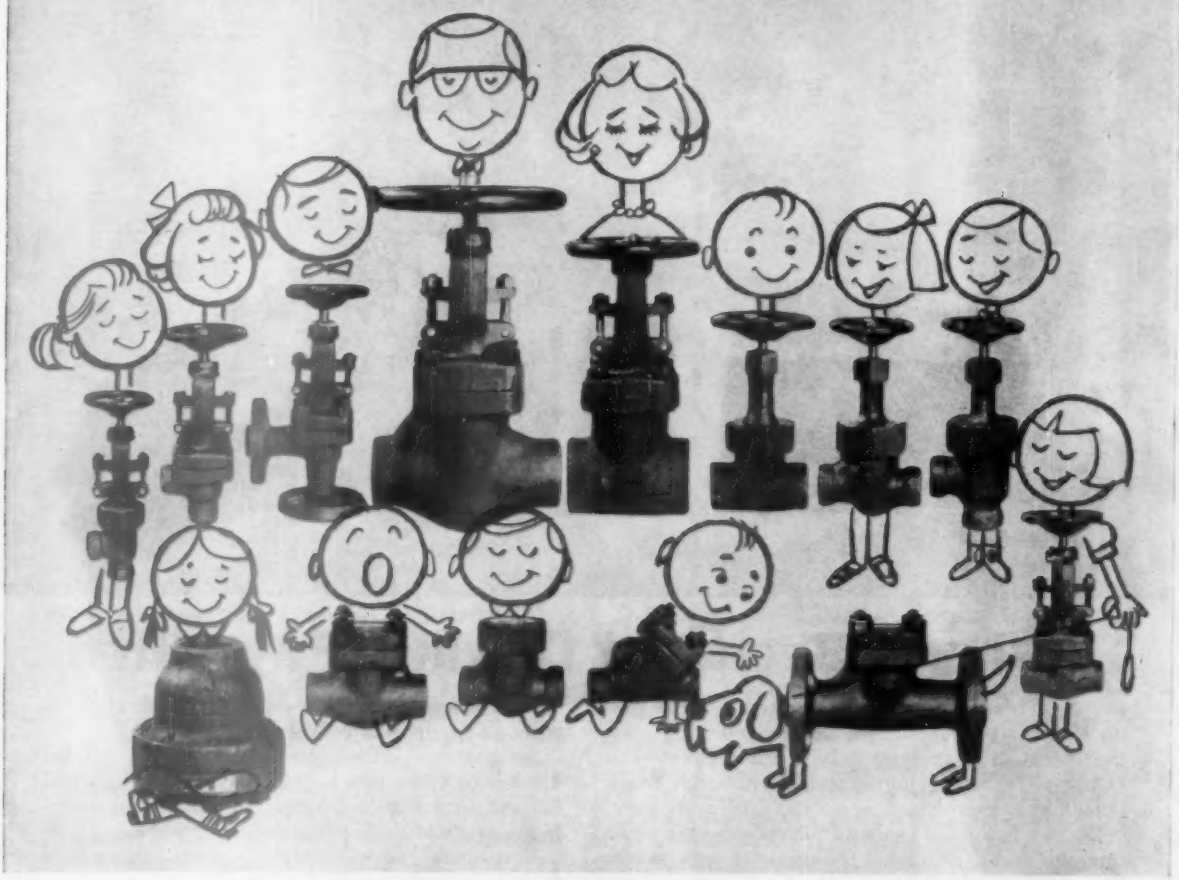
A. The full Buffalo market is not needed to meet oil policy goals. This market is equivalent to the entire export increase that is planned through 1963, throughout the Great Lakes and North Central states.

Armstrong

Q. Then neither the U. S. producer nor Washington imports officials should have any cause for concern about excessive Canadian exports?

A. Both the Canadian industry and the government are of one mind on this. We are determined not to abuse our status under the continental concept which exempts overland shipments from Canada.

CRANE'S LARGE FAMILY OF SMALL STEEL VALVES



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*Stellite is a registered trademark of Union Carbide Corp.

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Where 'Backseat Driving' Pays Off

On land, backseat driving is scorned, usually produces only trouble. At sea, however, driving from the "backseat" is proving to be a profitable method of operation, producing *more efficient water transportation of petroleum.*

Sinclair Refining Company currently operates two unique "bridge-aft" ships for crude oil movement. The ships' design eliminates the traditional midship superstructure. This has resulted in construction and maintenance savings and added cargo-carrying capacity. Operating experience has shown that these ships are easier to navigate and provide even greater crew safety than do conventional tankers.

Satisfactory performance by these ships has led Sinclair to order two larger and faster "bridge-aft" tankers, each with approximately double the carrying capacity of the existing ships.

Economical transportation is essential to an integrated organization dealing in a bulk commodity like petroleum, and the improved *tankers which provide this transportation contribute to the profitable growth of the organization.*

SNAME—Sinclair salutes the Society of Naval Architects and Marine Engineers, which since 1893 has contributed importantly to America's maritime progress. Through its 7,000 members, the SNAME promotes the art and science of ship building and engineering, thereby helping to maintain the strength of the naval forces guarding our freedom and the merchant ships carrying our trade.

Sinclair

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Big Pipe Arch Goes Up Fast

A MASSIVE "self-supporting" pipe arch is being used to carry gas over Coldwater Creek in northern St. Louis County, Missouri.

The arch is 150 ft. long with a 20-ft. rise, and is the biggest of its kind in the United States. It carries gas at 880 psi. from a 20-in. line of the Laclede Gas Co. The line handles up to 200,000 M.c.f. daily.

One of the biggest advantages of this type of crossing is the speed of installation. Field crews erected the arch, shown above, in 12 hours.

The span was fabricated in halves at the St. Louis shops of Midwest Piping Co., Inc., and transported to the site about 20 miles north of St. Louis.

Each half consisted of a converging pair of 16-in. pipes. These are ⅜-in. wall, seamless, X-46, carbon steel pipe. Intermediate supports are 12-in. standard A-53B seamless.

Tees for both the end supports and middle junction are 16-in., extra-strong, straight tees. Those for the end supports were taper bored at one end and at the branch to standard weight. Tees for the middle junction were tapered through the run only to standard weight.

The reducer is 20-in. Schedule 40 A-106B pipe that was swaged and taper bored to 16-in. It also is extra strong.

The pre-poured concrete foundations are anchored in bedrock. There is a difference of 5 ft. in their elevation, and the placement of the header at each end was designed to compensate for this difference.

Except for lateral loadings, the arch is structurally a compressive member. However, it can be a tension member when it acts as a carrier for high-pressure gas.

United Sues Commission

UNITED Gas Pipe Line Co. is not going to lose a lush gas market in San Antonio, Tex., without a fight.

Rebuffed by the Railroad Commission, the company has gone to court in its effort to stop the city of San Antonio from switching to newly formed Alamo Gas Supply Co. as its gas supplier.

United filed suit last week in Austin against the city, Alamo Gas Supply, and the commission. It sought a declaratory judgment which would require the commission to consider the evidence and determine whether the switch to Alamo is in the public interest.

The commission declined to consider the case earlier on grounds that it lacked jurisdiction. United terms this an arbitrary decision contrary to the law.

The company claims the change would not be in the public interest. Its attorneys feel the suit may develop into a "landmark case."

Industry Briefs . . .

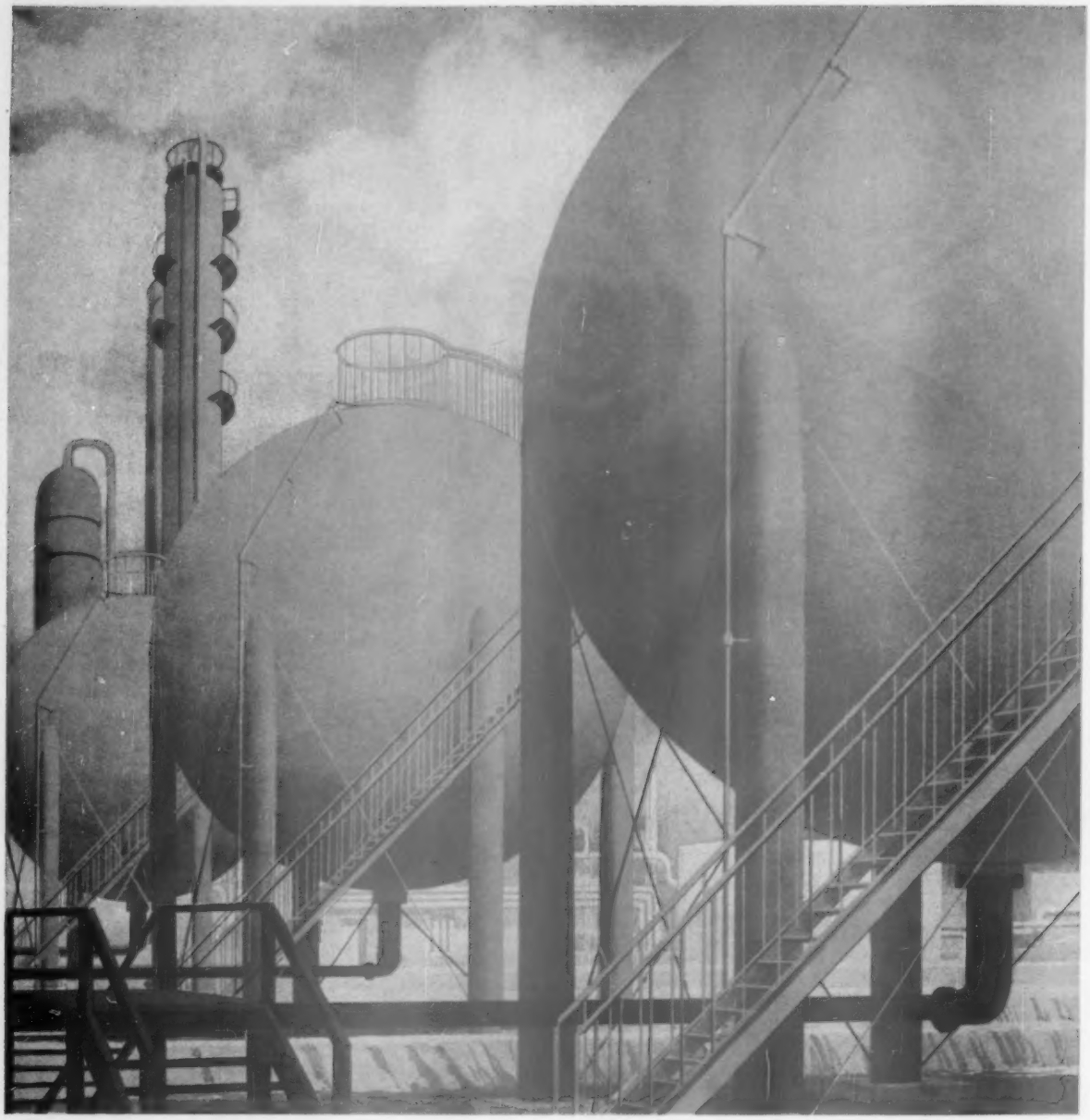
Texstar Corp., San Antonio, Tex., plans to acquire Pyramid Oil & Gas Corp., New York, and Petroleum Leaseholds, Inc., Houston, in exchange for a total of 1,291,767 shares of Texstar common stock. Stockholders will vote this month on the proposal. Pyramid has oil and gas reserves in Texas and Oklahoma. Petroleum Leaseholds owns oil and gas reserves in Louisiana, Illinois, and Texas.

The Monterey division of Humble Oil & Refining is being eliminated and operations absorbed by Humble's Los Angeles area office. R. E. Faggioli, who directed Humble's Los Angeles operations before the merger, will head the new office. (See personals for other changes.)

Proposed merger of Pecos Exploration Co., Dallas, into Alco Oil & Gas Corp., Chicago, has been approved by stockholders. Alco plans full development of Pecos oil and gas leases in Fort Stockton (Texas) field and Arkansas basin in Arkansas.

An allowable cut went into effect July 1 for the Albion-Pulaski-Scipio field in southern Michigan. The order limits wells to 100 bbl. of crude daily and a gas ratio of 150 M.c.f. Previous allowable was 125 bbl. and 165 M.c.f. State officials said withdrawals have been too high to assure maximum recovery. All operators who testified at a recent hearing opposed any reduction.

July oil allowable for Oklahoma has been set at 13 bbl. daily per well. This will produce about 505,000 bbl. daily, which is 15,000 bbl. above nominations for the month. The state Corporation Commission has maintained the 13-bbl. allowable since May.



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Imports Board Grants Appeals of Four Firms

- Action seems to cancel December move which reduced product imports into District 5. Other filings expected.

OIL COMPANIES now have reason to believe that they have a chance to get favorable action from the Oil Import Appeals Board if they can present a strong, logical case.

This hope stems from the fact that OIAB last week granted relief to four companies, some of which had been turned down repeatedly.

In the past, because of denial of virtually every appeal, the feeling had grown that a company was wasting time in going through the routine of an appeals board hearing.

But the present board, its members appointed since the Kennedy administration took office, apparently does not intend to follow the "no exception" policy.

Instead, its decisions last week tended to set a precedent for appeals based either on administrative error, governmental inaction, or a company's extreme hardship.

Texaco wins . . . For example, Texaco Inc. won an increase in its allocation by challenging Interior's procedure last December that resulted in a reduction of 11,500 bbl. daily in District 5 product import quotas.

This had occurred because Interior had changed the rules administratively to exclude from District 5 demand estimates the amount of products, other than residual fuel, shipped to Districts 1-4 in excess of such shipments during a similar period of 1958. The purpose at that time was to prevent any undue rise in product movements from District 5 to Districts 1-4.

Last week the board, conceding that Interior had taken such action without an amendment to the presidential proclamation, granted Texaco an increase of 779 bbl. daily—its share of the 11,500-bbl. total.

Obviously, other companies similarly affected will now file appeals so the net effect of the board's ruling will be to invalidate the cuts made last December (OGJ, Dec. 5, 1960, p. 82).

Other cases . . . Crown Central Petroleum Co. won its appeal on another point. Its case was that it tried repeatedly to establish an import record when the voluntary control program was in effect, but that delays by the Office of Civil and Defense Mobilization had caused it to fail, thereby reducing the amount for which it qualified under the mandatory program.

The board agreed and increased Crown Central's allocation to 7,155 bbl. daily from 3,407 bbl. daily.

Two other companies, Danaho Refining Co. and Nish-Paul Oil Co., got partial satisfaction from their hardship appeals.

In each case, the board found that the company had not been able to get sufficient feed stocks at prices that would enable it to compete. So each was given an increased quota. However, the board specified that this was for one allocation period only, apparently to give the companies time to work out some other source of supply.

In other cases acted on last week, the board rejected five appeals.

Humble Name Given to Huge New Pipeline Firm

THE GIANT new pipeline company formed by the merger of Humble Pipe Line Co. and Interstate Oil Pipe Line Co. will take the Humble name when the merger officially occurs about August 1.

A number of details about the merger of the two domestic pipeline members of the Jersey Standard family were disclosed last week. The basic merger plan was announced in early June (OGJ, June 5, p. 50).

While the new company will be called Humble Pipe Line Co. and will be headquartered in Houston, the Humble home city, the consolidation technically is being done by merging Humble Pipe Line into Interstate. The Humble company is a Texas corporation, and Interstate is a Delaware corporation. The new corporation also will be a Delaware corporation.

The merged company will be a wholly owned subsidiary of Humble Oil & Refining Co., a subsidiary of Standard Oil Co. (N. J.).

Interstate has been a direct subsidiary of Jersey.

Interstate's general offices in Shreveport will be drastically reduced in size, and many employes will move to Houston. The first will go about August 1 and the remainder, according to plans, before the opening of the fall school term.

Headquarters will be in Houston's Melrose building, where Humble Pipe Line presently is located, but will be moved next year to a 44-story Humble building now under construction.

Early retirement has been offered for Interstate employes nearing retirement age who do not wish to relocate.

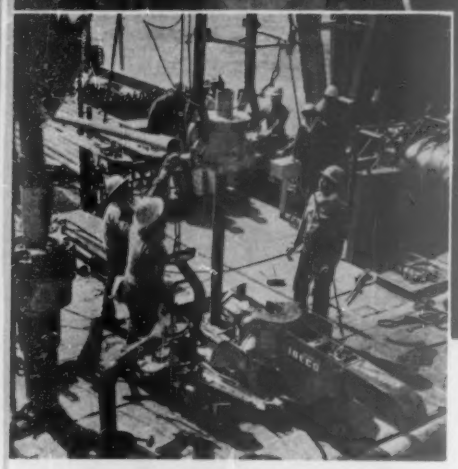
The Shreveport office will continue to operate as headquarters for the present Interstate field operations in Louisiana, Mississippi, Illinois, and Montana. Field employes will not be affected at this time. Humble Pipe Line's operations presently are confined to Texas.

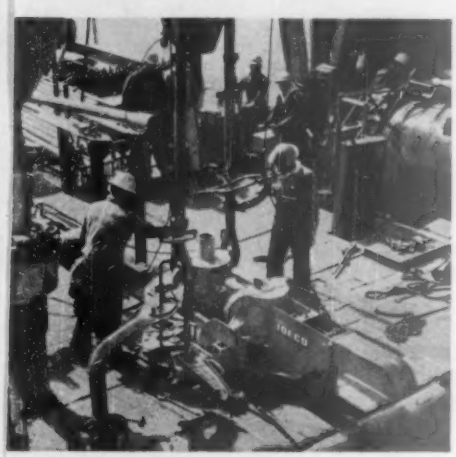
The new company will move more than 1 million barrels of crude and products daily and will rank as first in throughput among the crude pipeline systems of the nation, according to Interstate.

However, in line mileage its 12,500 miles will be less than the 14,925 miles operated by Service Pipe Line Co., Tulsa, subsidiary of Standard Oil Co. (Ind.)

As announced previously, Interstate's president Phelan H. Hunter will move to Houston as president of the new line. Humble Pipe Line's president, William S. Spangler, will become executive vice president. Both will be directors.

MOHOLE REPORT:





Above: A stand is being lowered into the hole. Below: Links are shifted automatically as two elevators rest on base.

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Dollar Decline Cuts Price of Canadian Crude

• Change could mean increased imports into wider areas of the U. S. But the odds are against it, since any big jump could bring Canadian crude under import controls. In the meantime: Money in pockets of U. S. importers.

THE 6-CENT decline from the 1960 exchange value of the Canadian dollar has made Canadian crude 15 to 20 cents a barrel cheaper to U. S. refiners than it was a year ago.

This figure is arrived at by multiplying the 6-cent drop by the $3 per barrel approximate value of the combined crude and transportation cost paid in Canadian currency. This applies to a volume of exports which averaged 155,000 bbl. daily the first half of 1961.

A reverse effect will be to increase correspondingly the cost of oil-field equipment imported into Canada. But most attention has been focused on the effect on crude prices.

One U. S. refiner running both Alberta and Mid-Continent oil sums up early opinion this way:

"If the Canadian dollar stays down, as the government intends, in areas where Alberta crude was already competitive it will change from a 'fairly attractive' status to 'almost compelling' if economics alone are considered."

However, Canadian and U. S. crude are meeting in an increasing number of markets in the North Central and Great Lakes states. Wellhead prices are, therefore, even more sensitive to each other than they have been in the past.

This raises the question as to whether the widened gap between laid-down costs of U. S. and Alberta crudes, in the Great Lakes particularly, can continue.

"If the Canadian dollar stabilizes at its present level (just below 97 cents U. S.), then one or the other is going to have to adjust," says a second refiner using both Canadian and U. S. supplies.

What next? . . . What will happen was a favorite guessing game in the industry of both countries last week.

The refiner who is a net crude buyer was pleased with the prospect of a sizable cut in his raw-material costs. The U. S. producer, on the other hand, feared a possible price cut.

Here were some of the guesses offered by refiners and producers:

. . . An increase in the wellhead price in Canada.

. . . A decrease in the wellhead price in the U. S.

. . . A dual-pricing system in Canada, unchanged domestically and increased for export sales.

. . . A tariff increase on Canadian oil to offset the exchange drop.

. . . An increase in exports to the U. S., with deeper penetration of U. S. markets until Canadian crude reaches a new point of equalization—Chicago, for example.

Dollar devaluation . . . For the moment, all of these questions must remain academic.

Any adjustments will have to wait for the dollar to settle down. Where that will be is anybody's guess.

Since 1959 the premium on the Canadian dollar has experienced two sharp declines. It dropped from more than 5 cents above the U. S. dollar to just above 1 cent in May of 1960. It then rose to more than 3 cents, then slipped another cent by December.

Then the so-called baby budget put into effect measures designed to curtail the inflow of foreign capital. By early January the premium dropped almost to a par with the U. S. dollar in New York.

Afterward it rose to a 1-cent premium, or slightly above. That's where it stood when Canadian Finance Minister Donald Fleming brought down the government's main budget in mid-June.

The budget set forth a program of deficit spending, lower interest rates, and a deliberately cheaper dollar. The aims were to cut the price of Canadian goods (including oil) in world commerce and increase the cost of imports (including oil and oil-field equipment).

In 2 weeks after the announcement, the dollar tumbled once more from $1.01 to less than $0.97 U. S. This was 6 cents below last year's average.

The Canadian Government is understood to favor a relative value of between 95 and 97 cents to accomplish its goals.

Whether controls available to the finance minister, such as purchasing U. S. dollars, are sufficient to keep the exchange rate at the desired level remains to be seen.

Effect of devaluation . . . If the past is any guide, a change in the wellhead price of Canadian crude might be predicted.

Of the more than 20 changes in Canadian crude prices since 1947—the beginning of major production in the dominion—eight have varied with the exchange value of the dollar. Variations have been in both directions.

The last price adjustment due to exchange value was April 12, 1958.

As the Canadian exchange premium rose, the effect was to raise the price of Canadian crude to U. S. producers. Wellhead prices were cut accordingly.

However, the Canadian suppliers were pricing themselves out of U. S. markets. And so the heat was on Canada to cut to remain competitive.

Now the crude situation is reversed. The competitive pressure is on U. S. crude.

There are two additional arguments against a Canadian price increase. It would be hard to explain to Canadian consumers. And it would seem to defy the government's expressed fiscal policy.

"The natural result, if the rule of economics were followed, would be further penetration of the U. S. until a new point of equalization were reached," commented one refiner.

This would apply in the upper Midwest states where Canadian crude has been finding new customers this year. If Canadian crude was competitive when the exchange

premium was 5 cents, then it is now 24 cents a barrel cheaper in those areas, with a 97-cent dollar.

Governments' attitude . . . Although an increase in exports might be expected to follow from the stronger price incentive, the size of the increase is likely to be kept low.

The reason is the influence of both governments involved.

Although Canada is exempt from the U. S. imports-control program, it is nonetheless subject to an unofficial quota system. Exports the first half of this year were up 37,000 bbl. daily, and the July estimate is almost 200,000 bbl. daily.

Both Ottawa and Washington are understood to consider that exports this year are approaching the maximum "reasonable" level. If they should rise beyond this unspecified reasonable level, and unduly displace U. S. supplies, then Washington has warned of a possible formal quota system for Canada.

Even before the further decline in the Canadian dollar, U. S. refiners were known to be ready customers for increased volumes of Canadian crude. The major deterrent was uncertainty as to the attitude of imports officials.

In order not to jeopardize Canada's exempt status, the Canadian Government used its influence to defer more than one new sale.

With the governments actively in the picture, adjustments to meet the changed competitive situation become harder to predict.

Strike Settlement to Raise U. S. Tanker Costs

• Tentative agreements indicate final terms will push wages up 10¾% and increase fringe benefits. Foreign flag issue may be postponed.

THE COSTS of operating U. S. flag tankers will rise significantly in the next 4 years.

This was clear from the pattern of tentative agreements made last week between tanker operators and members of the National Maritime Union.

Agreements were contingent upon operators signing contracts with two other unions—the Marine Engineers Beneficial Association and the Masters, Mates, and Pilots. The American Radio Association also signed with the owners on similar terms.

But operators could get off for no less than the NMU offer in any final settlement.

This would be a 10¾% increase in wages and an 11% increase in other benefits over the next 4 years, effective June 16. That's the day the maritime strike began tying up most of the 135 tankers controlled by the 19 companies having contracts with the five unions involved.

With wages comprising more than half a tanker's daily operating costs, an increase of this magnitude will be felt quickly.

What seamen won . . . Here's what Joseph Curran won for his able-bodied seamen:

. . . A 10¾% wage increase spread out over 4 years with 4% the first year and 2¼% in each of the next 3 years.

. . . Additional pension and welfare contributions of 50 cents per man per day, raising the total to $1.91

. . . Increased vacations to 60 days per year.

. . . Increased lodging allowances from $10.50 to $13 per day.

. . . Increased per diem payments from $6 to $10 per day while traveling ashore.

Under the contract which expired June 15, the unlicensed seamen received $373 per month base pay plus $2.98 an hour for all time worked beyond 40 hours. The wage and fringe benefit package was estimated by tanker operators to be worth $660 per month, not counting about $100 per month worth of food, quarters, and medical care.

If officers win corresponding increases, these will be a sizeable addition to the payroll.

Foreign flag issue . . . The way for agreement on economic issues was opened when Curran modified his demand for the right to organize American-owned ships flying the Panama, Liberia, and Honduras flags.

The union settled for a Government study of the problems raised by registration under these friendly foreign flags to escape high U. S. taxes and wages.

Late last week the holdout unions were still demanding jurisdiction over foreign flag crews. This was the issue which deadlocked negotiations in the early stages.

Back to work . . . The Seafarers International Union and the other four cited in the government temporary restraining order directing strikers to return to work stopped picketing by mid week.

All said they would cooperate and man the ships once more, although some promised to appeal to the Supreme Court a Taft-Hartley injunction that would stop the strike for 80 days.

Gulf Lifts Proration as Strike Eases

GULF Oil Corp. was taking steps last week to lift its proration of crude purchases in Texas, Louisiana, and New Mexico and to restore its refinery throughput at Port Arthur to normal.

Problems of storage and tanker scheduling delayed an immediate decision to return to business-as-usual. Gulf cut Texas buying by one-eighth for June, New Mexico purchases were trimmed by 18.5% and Louisiana (in the Ostrica terminal area) by 30%. The cutback in runs at Port Arthur was 65,000 bbl. daily.

Sinclair Oil Corp. continued prorating purchases in Texas to 50% of the allowable. Sinclair refineries are running at partial capacity because of a strike of the Oil, Chemical & Atomic Workers Union. Supervisory personnel are manning the units.

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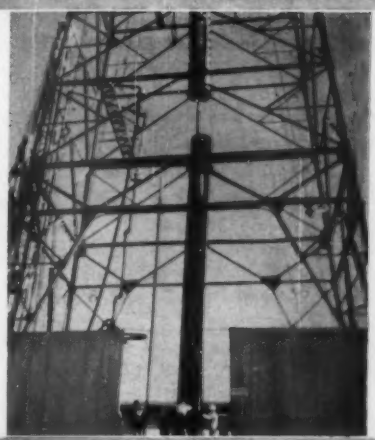

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"New" FPC: New Faces, New Approach

• Democratic control of agency is bound to have powerful effect on natural-gas regulation. But new members Swidler, Morgan, and appointee O'Connor can be expected to move warily. In any case, change is certain.

ASSUMING that the appointment of L. J. O'Connor, Jr., to the Federal Power Commission will be approved by the Senate, the "new look" at the commission will soon be complete.

Since all three of the new commissioners—O'Connor, Joseph Swidler and Howard Morgan—are Democrats, the Kennedy administration has majority control of the agency. It is quite a switch from the situation of only a few days ago when the Democrats did not have a single man on the commission.

The big question now is what effect the new commissioners and the new party leadership will have on the shape of natural-gas regulation.

There is little doubt that the impact will be substantial.

For one thing, these are new men with new views on how to get the job done.

For another, it had become clear that major changes had to be made in regulatory procedures regardless of who controlled the commission. Therefore, the new men are moving in at a critical juncture.

What, then, is the most likely course of action?

New laws? . . . The greatest potential lies in obtaining corrective legislation to enable the commission to operate in a practical manner.

If the administration and the commission majority can agree on proposed changes and press for them aggressively, the regulatory picture could be changed drastically.

This was true when the Republicans were in control of the White House and the commission. But you will recall that while former President Eisenhower favored natural-gas legislation, he left the initiative largely to Congress. Taking its cue from this, the commission limited its efforts in the field of legislation to its annual mild suggestions to Congress.

The net result was that there was little real drive for action from two key points.

Meanwhile, in face of the presidential veto of the 1956 gas bill, Congress and the industry also became reluctant, so that nothing was accomplished and the regulatory pile-up at the FPC worsened.

As things now stand, there is little to indicate that either Congress or the industry is going to press for action unless and until the administration makes the first move.

That puts the challenge squarely before the new commission majority and the administration. It must be clear to both that unless they can get together on an over-all plan, there is scant hope for improvement in the current situation.

They should be encouraged by the fact, however, that they will deal with a Democratic Congress, whereas the Republican administration had to face an opposition party most of the time.

Probable approach . . . If, then, the challenge is accepted, what will be the course of action?

A compromise approach is the most likely.

This means that complete decontrol of producers is out of the question.

But it means, too, that efforts to regulate producers on a utility-type cost-of-service basis will be abandoned. The old commission had already veered away from that, saying it was impossible.

The administration has already suggested exemption of small producers from direct regulation as a possible approach. But it has left unanswered the big question of how prices for the remaining producers would be regulated. Until this issue and others are settled, little progress can be expected.

It is a good guess that the White House will insist on some built-in protection of consumer prices to satisfy the "liberal" segment of Congress, and that it will want to pacify the coal industry with some restriction on industrial sales.

To satisfy gas distribution companies, the administration probably will seek to include some prohibition of multiple rate increases by pipeline companies.

Such broad aspects have become apparent, but many of the specifics are still cloudy. That is where the new majority becomes important, for the indications are that the administration hopes the new men will come up with some of the answers.

The new men . . . What answers will Swidler, Morgan and O'Connor provide?

They will not offer any significant ones in the immediate future. Each of the three is approaching his new assignment with caution. Each wants to be sure he is on firm footing be-

O'Connor Will Bring

LAWRENCE J. O'CONNOR, JR., is one step away from the biggest job he has ever tackled.

If the Senate approves his nomination, as expected, he will soon move to the Federal Power Commission from his present post as oil imports administrator.

This will make it necessary for Interior Department to line up a new imports administrator, although this probably will not be done until the Senate has acted on O'Connor's appointment to the FPC.

O'Connor, 46, has had no regulatory experience, other than his work with import controls. However, he has a much better working knowledge of the oil and gas industry than either of the other two newest members on the commission.

Born in Tulsa, O'Connor lived for a time in Pennsylvania before he returned to Oklahoma where he graduated from high school.

fore he starts moving into action.

So the first actual result of the turnover at the commission will be a further lag in the regulatory pace. This is inevitable. Such a lag will be compounded by the staff, which to a large extent must wait on the new majority for its signals.

The length of this lag will depend on how soon the ideas of the new commissioners jell, and on how far apart those jelled ideas are. It may develop that one or more of them will side with one or more of the two holdover members in a coalition that would cut across party lines.

At this point, none of the three has indicated that he has a clear-cut plan of action already in hand.

Conjecture must be based strictly on the nature of these new men.

One can guess, for example, that Morgan is the most likely to assume a role somewhat similar to that of former commissioner William Connole. That is, he will be the focal point of those who stress consumer price protection.

This does not mean that Morgan will be unfair, or that his stance will be unyielding. For instance, he already eyes askance the legislative proposal that pipeline companies be barred from seeking a second rate increase if a first request is still pending before the commission. His reaction is that such a ban, when a company could prove the need for a second hike, would be unfair—and probably illegal.

And even though Morgan may desire the role of crusader, he is also a politician who knows the value of a practical approach.

Swidler is even more difficult to put into a pre-determined category.

Even though most of his career was with the Tennessee Valley Authority, there are strong indications that he is approaching his new job with an open mind.

Observers at the Senate committee hearing on his nomination were generally impressed with the presentation he made.

O'Connor, too, is by nature a retiring individual — even a little shy—who will not try to hurry into the spotlight. Those who know him well feel he will lean over backward to avoid any label as an "industry" man.

During his tenure as oil imports administrator, O'Connor has gained a reputation as a fair-minded, deliberate administrator who studies a problem carefully before making a decision, but who stands firm once the decision is made.

All in all, it is not likely that any one member will emerge as the "strong man" of the commission. Rather, an effort will be made to present a teamwork approach.

Crude and Oil-Product Imports Rise

IMPORTS of crude and oil products, excluding exempt imports from Canada and Mexico, were almost 33,000 bbl. a day higher in May than in the same month of 1960.

The imports in May 1961 totaled 1,435,945 bbl. daily, Interior Department reported last week, compared with 1,403,004 bbl. daily in May 1960.

Exempt imports also rose. Overland imports from Canada during May of this year were 175,388 bbl. daily, and from Mexico, 28,123 bbl. daily. During May a year ago, exempt Canadian imports were 120,373 bbl. daily, and none were listed from Mexico.

Observers did note, however, that the May shipments from Mexico reflected an agreement earlier this year between Mexico and U. S. oil officials that Mexico would hold the total to around an average of 30,000 bbl. daily. Before the agreement, the flow of oil from Mexico into the U. S. at Brownsville had been more.

Interior's breakdown of total import figures for May 1961:

Districts 1-4—Crude and unfinished oils, 720,610 bbl.; finished products 44,273; residual fuel oil, 321,324; exempt imports from Canada, 85,957 bbl. daily of crude and unfinished oils and finished products; and exempt imports from Mexico, 28,123.

District 5—Crude and unfinished oils, 228,369 bbl. daily, finished products, 12,518; residual fuel oil, 7,521; and exempt imports from Canada, 89,431.

Puerto Rico—Crude and unfinished oils, 94,533 bbl. daily; finished products, 5,294; and residual fuel oil, 1,503.

ood Knowledge of Oil, Gas to FPC Job

He attended Rice Institute and arvard, getting his undergraduate egree at Rice and his master's at arvard. His major: Business administration.

He worked for 7 years with an counting firm in Houston before ining Goldstron Oil Corp., a procing company, in 1945. Later he is a vice-president and treasurer Goldston.

In 1958 he became an independt oil and gas consultant in Houson, and in 1959 went to Washingn as assistant director of the Ofe of Oil and Gas. A year later he came oil imports administrator d was retained in that job when Kennedy administration took er. He is a Democrat.

During his years with Goldston, Connor was active in oil associan work. He served on several mmittees of the Independent Peleum Association of America.

Lawrence J. O'Connor, Jr.
. . . ready for his biggest job.

O'Connor also was chairman of an IPAA tax committee for a time and assisted with other studies, including supply - demand and productive-capacity surveys.

Giant IPC Looping Project in Final Stages

• Work's being pushed on last leg of 30/32-in. loop from Kirkuk field to Lebanon, despite company hassles with Iraq and with Kuwait Government.

CONSTRUCTION is in progress on the final 60-mile section of a 530-mile 30 to 32-in. loop from Iraq's Kirkuk oil field to Tripoli, Lebanon.

The giant looping project, which is going ahead despite Iraqi disputes with Iraq Petroleum Co. and the Kuwait Government, will increase the capacity of the pipeline system to the Mediterranean from 700,000 to 960,000 bbl. daily.

An existing 16-in. crude line will be converted to a gas line as far as T4 pumping station when the completed loop opens later this year. The converted line will supply gas from Kirkuk to drive new pumping equipment being installed at K1, K3, T2, and T4.

Five Westinghouse W82M gas turbines, rated at 6,000 hp. at 150° F., will be installed at T2 and T4. They will power 5,000-r.p.m. centrifugal crude pumps on direct drive. T2 and T4 are being instrumented for remote control from T3.

When this program is completed, IPC's Kirkuk system will include two 30-in. lines and a 12-in. crude line originating at the field, in addition to the 16-in. converted gas line.

The original 30-in. line terminates at Banias, Syria, while the 12 and 16-in. lines terminate at Tripoli. A 68-mile 24-in. loop on the final 30-in. section of the line to Banias also has been completed.

Kirkuk field . . . Most of the crude for the expanded system will originate in Kirkuk, which has already produced more than 2 billion bbl. since its discovery 34 years ago.

Forty-four producing wells last year—tapping a shallow, 2,800-ft. pay—averaged 643,000 bbl. daily. This is a per-well average of 14,600 bbl. daily. A water-injection program is now being developed in the field.

Kirkuk deliveries to the Mediterranean are supplemented by crude from two relatively small fields in the northwest. These are Ain Zalah, which averages 18,400 bbl. daily, and Butmah, which produces 8,500 bbl. daily.

Expand berthing . . . A major expansion is in progress at IPC's Tripoli terminal. New offshore tanker berths are being installed in place of existing mooring facilities. These will handle tankers of up to 85,000 tons, and will be ready for service later this summer.

New offshore loading lines also are being installed. Twin 24-in. lines have ben laid to Berth No. 1, and a single 32-in. line has been installed at Berth No. 2. Another single 32-in. line will be pulled soon to Berth No. 3.

Aramco Installs In-Line Crude Blending

FACILITIES for in-line blending of Saudi Arabian crude and products are being put into service at Ras Tanura terminal by Arabian American Oil Co.

The $600,000 installation blends crudes with products, or with other crudes, and delivers the mix directly to tankers. It can mix up to 20,000 bbl. per hour, the largest capacity of any in-line blender in the world.

The unit is believed to be the first of its type that can blend petroleum mixtures uniformly in pipelines and send them to tankers without the need of tank storage.

The project will enable Aramco to tailor its crude deliveries to the needs of individual refineries throughout the world. Demand for special blends in the past has been small, but Aramco expects this type of business to increase.

When the installation is in full-time service, the mixing of crude with refined products in ships' tanks at North Pier will be eliminated. This method does not always produce a uniform blend.

The in-line facilities have been installed on a large metal grate that straddles the shipping pipelines running from the tank farm to North Pier. Five metering stations and eight meters on the platform are connected to a control console in a nearby pumphouse.

Each of the five metering stations is tied to at least two crude and product lines. Two of the stations may be operated at once.

Two of the eight meters work on a positive displacement principle and are used for blending LPG into crude. The remaining six blend crude and products other than LPG. They are the first turbine-type meters ever installed on a blender outside the U. S.

An operator in terminal Pumphouse No. 2 sets a series of controls in accordance with the offtaker's order for blend composition and total quantity required by the waiting tanker. The blend is started running directly to the tanker after electronic tests are made for such

FOREIGN

A $400,000 fire at a booster pumping station in Saudi Arabia's Abqaiq oil field was blamed on a rupture in a portable diesel pump. Escaping oil was set afire by the exhaust of another diesel. Aramco shut down Abqaiq and Ghawar fields for 12 hours during the fire. Deliveries to Tapline and Ras Tanura terminal were not affected.

United Carbon France, SA, a United Carbon Co. subsidiary, has built a $5 million carbon-black plant at Port Jerome, France. Fuel oil feed stock will be used to produce 50 million pounds yearly of furnace black.

Dansk Veedol A/S has acquired a chain of 40 service stations in Denmark in its efforts to build a

factors as calibration of meters.

Periodic checks are made while a tanker is being loaded to see that the mixture matches specifications.

New Refineries Go on Stream in Norway, Singapore

TWO new refineries thousands of miles apart illustrate how far the trend has gone toward plant construction in smaller consuming countries.

In Norway, long an important export market for refineries in other parts of Europe, A/S Esso has opened the country's first major processing facility, a 42,000 - bbl. plant at Slagenslagen.

Demand on the order of 80,000 bbl. daily means product imports will continue, but at a sharply reduced level.

Singapore, near big refineries in Indonesia and only a relatively short hop from plants in the Persian Gulf, also is getting its first refinery. This will be a 20,000-bbl. refinery on Pulau Bukom, to be opened this month by Royal Dutch-Shell.

Demands in Singapore and neighboring Malaya are also in the 80,000-bbl. daily range.

Tanker to Be Largest Built in Europe

A 92,000-ton tanker, biggest ever built in Europe, will come out of a Swedish shipyard early in 1964 and join the Mobil Oil tanker fleet.

Mobil Tankships, Ltd., a British affiliate of Socony Mobil Oil Co., signed the contract for construction of the mammoth ship last week with Eriksberg Shipyard, Goteborg, Sweden. The new vessel will replace an earlier contract calling for one of only 48,000 tons.

The 900-ft. long ship, 127-ft. wide, and drawing 47½ ft. of water, will easily be the largest in the Mobil Oil Fleet. It will carry Persian Gulf crude to Mobil refineries in the world's deep-water ports.

The vessel will travel at 17 knots and can discharge its 637 000-bbl. cargo in 10 hours.

Crude Lines to Carry Water for Jordan

IRAQ Petroleum Co. has turned over its idle pipelines in Jordan to the Jordanian Government for use as a water-carrying system.

An agreement between the company and the Hashemite kingdom grants the country the use of all the fixed assets of the 200-mile system. These include a 12 and a 16-in. pipeline and two pumping stations, H-4 and H-5.

Jordan will use components of the system as part of a nationwide water - development program. This will be based on a plan to fully utilize a plentiful but largely untapped supply of fresh water at Azrak, due south of H-5 pumping station in North Central Jordan.

The pipelines were originally built to move crude from Kirkuk field to Haifa refinery on the Mediterranean coast. Crude movements were suspended during the Israeli-Arab war in 1948, and the system has never been reopened.

The 12-in. line was commissioned in 1934, after a 2-year construction period. The 16-in. line was started in 1946, but the system was disrupted before the new line could be put into service. Since 1948, IPC has kept its installations in the country on a maintenance basis.

BRIEFS . . .

market for its 20,000-bbl. refinery being built at Kalundberg. The Tidewater subsidiary acquired the outlets, located on Laaland and Falster islands, from Lolland Falsters Nafta Benzin A/S.

The Japanese iron and steel industry is considering a switch from coke to fuel oil in its blast furnaces that would mean an additional market for 27,000 bbl. daily of residuals next year. The industry already uses 40,000 bbl. daily of fuel oil, but the product's use so far has been restricted to open hearth furnaces and hot rolling mills.

American Overseas, a Caltex affiliate, will renew its geological survey program this summer on the Spitzbergen Archipelago, located 370 miles north of Norway. Surface work on the islands, which cover an area nearly as large as West Virginia, started last year.

A deep New Zealand wildcat has yielded gas in two zones. The deepest pay in Mangahewa 1, in Taranaki, North Island, flowed gas from below 14,000 ft. A zone now under test 1,000 ft. higher in the well is flowing at 3,400 psi. Shell is operator in partnership with British Petroleum and a local firm, Todd Oil Services.

Pemex has obtained $102.6 million in European credits for the purchase of equipment. Seven French banks are putting up $37.6 million for Mexico's first West Coast refinery, at Mazatlan. Five French banks are extending for 2 years $50 million in credit for the purchase of oil and petrochemical equipment. Banks which put up $15 million in 1959 for purchases of gear in France, Germany, The Netherlands, Belgium, and Italy have extended another $15 million credit.

Portugal's second refinery will be a 20,000-bbl. plant at Oporto. The plant is planned by Sacor, a local company, which also plans to expand its existing plant at Cabo Ruivo, near Lisbon, from 22,900 to 30,000 bbl. The company has the right to supply 50% of the country's inland demand.

H. C. Sleigh Ltd., Melbourne, has paid £750,000 (about $1,670,000) for 10% interest in Associated Oil Group's Australian holdings. The group holds leases on more than 125,000 sq. miles, mostly in Queensland.

Oil Unruffled by Political "Storm" in Kuwait

• Normal output of 1,600,000 bbl. daily continues in tiny shaikhdom, where winds whip sand through Gilbert-and-Sullivan atmosphere that exists now.

PLAYING her protective role to the hilt, Britain moved more than 3,000 troops into Kuwait last week and spread them along the Iraqi border to forestall any attack which Iraq might make on the tiny Persian Gulf shaikhdom.

Iraq protested to the world, to the United Nations, and to her Arab neighbors that she has no intention of invading Kuwait. Iraq said her claims to Kuwait (lodged only after Britain pulled out as the little country's official protector) would be solved peaceably.

Oil, the key to all the fuss, was oblivious to the whole tempest in a teapot. Kuwait Oil Co. (KOC) owned by British Petroleum Co., and Gulf Oil, continued to produce its normal 1,600,000 bbl. daily. The company's only concession to the comic-opera military operations in the tiny Connecticut-sized country was to suspend operations outside the Ahmadi-Burgan area, the hard core of Kuwait production.

KOC halted operations in the relatively new Raudhatain field, where 29 wells produce oil just 20 miles south of the ill-defined Iraqi border. The company also pulled in its personnel at Minagish, a new field along the Kuwait-Neutral Zone border to the southwest. At Mutriba, in the northwest, operations were halted.

The company was only being prudent. It was a case of pulling in personnel and equipment or risking the chance of losing both in the whirlwind British troop movements, aggravated by winds which whipped sand into the eyes of the British, Kuwaiti regulars, volunteers from the desert tribes, and Saudi Arabian troops.

It all started when Gen. Abdul Karim Kassim, Iraq's revolutionary premier, claimed Kuwait and its oil reserves as an "integral part of Iraq" less than a week after Britain formally bowed out after 62 years as Kuwait's official protector under treaty (OGJ, July 3, p. 98).

The action split the Arab world into two camps. Saudi Arabia and other smaller Arab countries almost immediately fell behind Kuwait with solemn vows to help protect her new independence. Under terms of its new agreement with Kuwait, Britain moved troops in to protect the border.

(Middle East diplomatic sources last week were comparing the British action to "cracking a walnut with a sledge hammer.")

Iraq protested to the world that she had no military aims on Kuwait.

The man caught squarely in the middle was Egypt's Gamal Abdel Nasser, the Iraqi premier's arch rival for Arab leadership. He is faced with the prospect of siding with the British in protecting Kuwait against his rival, or acceding to Kassim's claim to a prize both would like to have—more than 60 billion barrels of oil reserves.

While Nasser himself is being diplomatically quiet, the Arab League, largely dominated by Nasser's United Arab Republic, is trying to bring about an "Arab" settlement of the problem in which the British would have no part. Abdel Khalek Hassouna, secretary general of the league, is beating a path between Baghdad, Kuwait, and Riyadh as the prime mediator.

Gulf Awards Contract for Denmark Plant

GULF Oil Corp. has awarded a contract for construction of its first European refinery.

A 30,000-bbl.-daily plant will be built for it at Stigsnaes, Southwest Zealand, Denmark, by Kellogg International Corp., subsidiary of M. W. Kellogg Co. of New York. No cost estimate has been given.

Construction will begin the latter part of this year, with completion expected by the end of 1962.

Output of the refinery, including a large range of products, will be distributed to Gulf's Scandinavian markets.

The refinery's main processing units will include a crude-atmospheric and vacuum-distillation unit, a naphtha-desulfurizing reforming unit, a visbreaking unit, and two desulfurizing units to provide low-sulfur fuel oils.

A marine jetty will be built off shore. It will handle tankers up to 50,000 dw. tons.

Denmark's product demand has been rising steadily. It consumed nearly 99,000 bbl. daily in 1960, a jump of 11.7% over 1959.

A Gulf spokesman said economists believe Denmark's consumption will rise to 140,000 bbl. daily by 1965.

Mobil Suspends First Maracaibo Test

MOBIL International has suspended its first try for crude production in Lake Maracaibo.

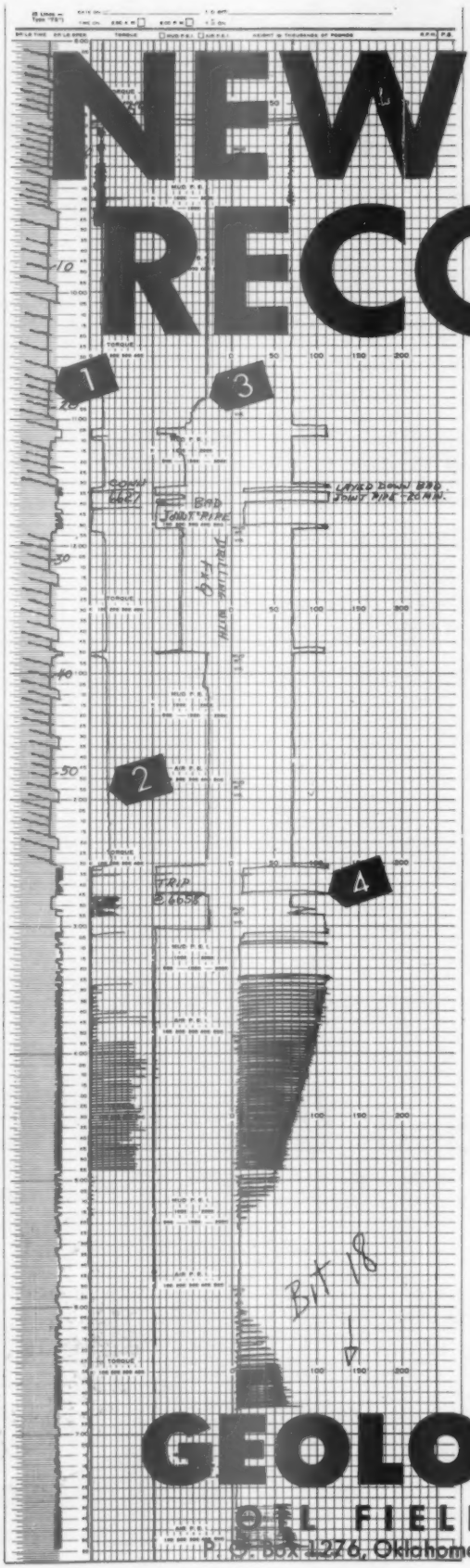
The company's MOB 568.1 on a farmout from Creole Petroleum was bottomed at 12,696 ft. as a noncommercial well. Mobil may later re-enter the hole and drill a deviated well.

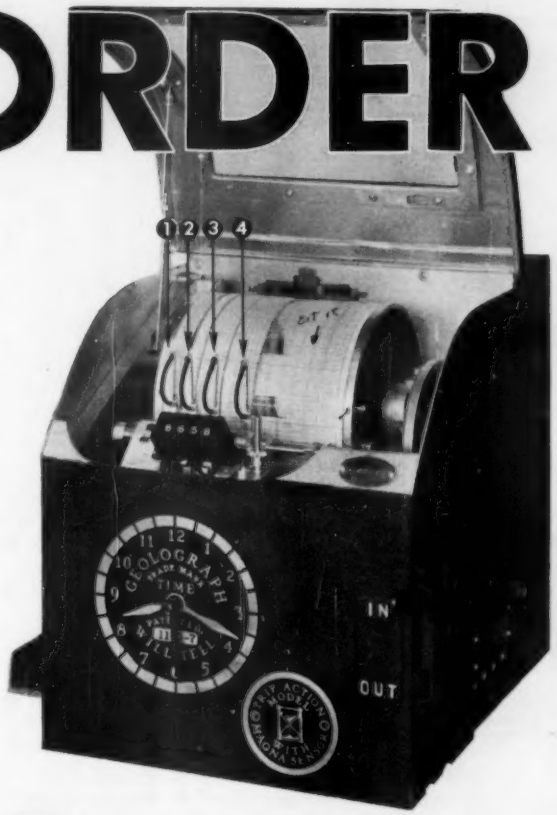
The well is on the east-west arm of a 12,038-acre tract in the central lake area, where prolific production has been developed by Superior Oil and other companies. The test is about 1½ miles north of Mene Grande's 3Y4X, a producing well on Block 3.

Mobil is financing and operating the acreage for the joint account of itself and Creole. It will take 75% of the crude, and Creole will take 25%.

There are three capped wells in the north-south portion of the tract. Another well drilled in the east-west arm of the farmout area before Mobil acquired the acreage was a dry hole. This was less than a mile east of the Superior area (OGJ, Dec. 12, p. 68).

NEW 4-PEN RECORDER





1 DRILLING TIME—Drilling time changed at 6618′ to 4 minutes per foot. The previous foot required 8 minutes to drill. (Drilling weight remained constant—did not influence the change in drilling time.)

2 TORQUE—At 1:56 and at a depth of 6651′, a cone locked on the bit and the resulting increase in torque was recorded.

3 PUMP PRESSURE—A constant mud pressure of approximately 2000 PSI maintained at 6619′ at which point the main pump began losing pressure. The stand-by pump was used until the main pump was repaired and returned to service at 12:51.

4 DRILLING WEIGHT—Note erratic weight from 2:45 to 2:54 resulting from a combination of a locked cone and junk in the hole. Trip was begun to replace bit.

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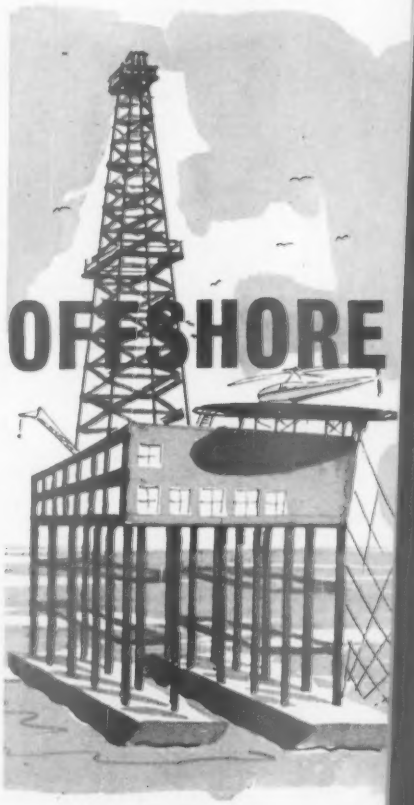
The OIL AND GAS JOURNAL

SPECIAL OFFSHORE SECTION

ALDEN J. LABORDE

"The Gulf of Mexico is the best place, if not the last good one, in the continental United States, in which to find and develop oil and gas reserves."

Not just problems—also some solutions are news among the offshore drillers. Some overwater areas are looking forward to their first real upturn in activity in several years. In the following pages, the Journal presents some of the most significant developments which should interest offshore drillers and producers everywhere.

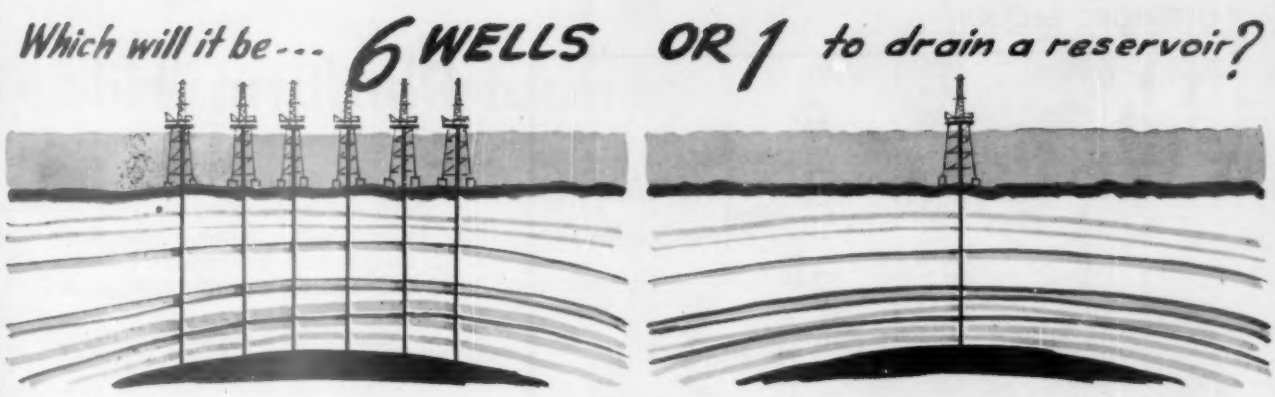


An industry head looks at what's needed

BY ALDEN J. LABORDE
President, Ocean Drilling & Exploration Co.,
New Orleans

I'VE BEEN ASKED, what is needed offshore? It would be a poor dreamer who could not come up with a hundred and one things in rapid order. However, I limit this reply to two thoughts, one for each of the hats I wear, those of drilling contractor and neophyte producer. I further limit myself to areas where I think corrections can be made without someone else being hurt or having to pay the cost. These are needed changes which I believe are sound because they aim toward greater efficiency by reducing wasted manpower, wasted money, idled equipment, lost oil and gas production.

First, as a drilling contractor—my plea is to offshore operators.



I urge them to plan their wells some months in advance to permit orderly and efficient scheduling of available drilling equipment. Down time and crew layoffs are murder to a drilling contractor, especially the offshore contractor. His expensive equipment deteriorates and his highly specialized crews scatter—or he can keep them employed at the risk of going broke.

It often happens that a day or two before a rig becomes idle, the operator's superintendent cannot notify the contractor that this will be "it," that in a day or so the rig will be released. It is not a case of bad will; the superintendent doesn't know, either. His management often does not tell him whether there will be another well. Still, just a few days before, contractor may have had to turn down an opportunity to bid on other work because of traditional responsibility to his present client.

This same operator who releases a rig today may be back hunting one in a couple of weeks. By this time the contractor likely has found another job and moved out of the field, or else laid off his crews. Having waited until the last minute before a lease expiration to okay the well, management now becomes desperate, and tells the superintendent to get started yesterday. A long and unnecessary tow, use of equipment poorly suited to the job, perhaps a higher rate, and general confusion are the price he pays.

I suggest that proper advance planning of the work by the operator would avoid such situations which are unfortunate from both points of view. The contractor would have had the comfort of knowing his rig would be employed, he would operate with the same experienced crews from well to well and, without a doubt, his bid price would be lower.

The operator who goes along with this suggestion (some, although too few, now do), can make long-term deals or multiple-well contracts for his drilling, and give the contractor reasonable notice of his intention to terminate. I submit that operator is much better off and enjoys a better job for less money. The contractor, too, can plan this work, perform it cheaper, and have better, more experienced and happier employes.

This likely cannot be accomplished quickly, nor by individual contractors, nor by their organizations or associations. I feel that it will come to pass only if and when the operators analyze present practices and conclude that it is to their **own selfish interest** to follow these suggestions. Under pressure of their own problems they have not seriously considered the contractor's view. Operating divisions have not properly advised their higher management of the problem and the adverse consequences of this short-sighted practice to themselves and the industry in general. We, as contractors, must accept a large share of the blame in that we have not effectively told our story.

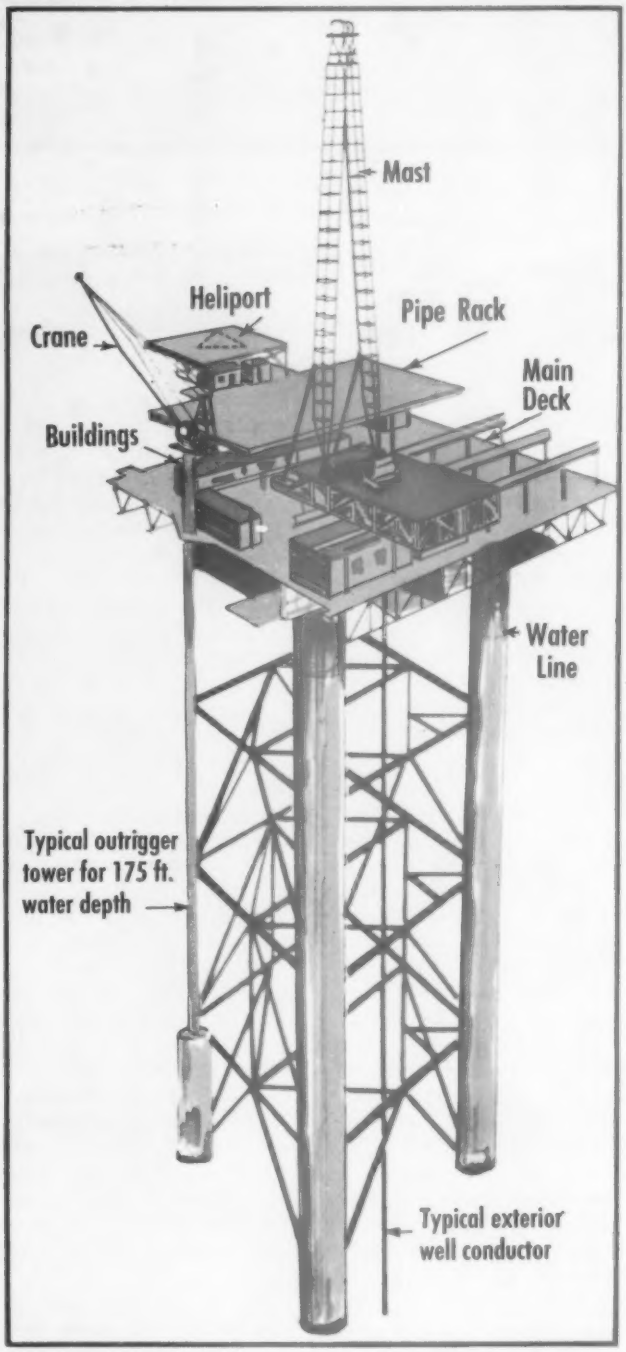
Stimulus needed. Now for my point as an offshore operator. I speak as one dedicated and irrevocably committed to the proposition that the Gulf of Mexico is the best place, if not the last, good one, in the continental United States in which to find and develop substantial oil and gas reserves. This conclusion is sufficient to keep operators out there looking, as they have been, in spite of many artifical and arbitrary impediments to maximum efficiency imposed by regulation and tradition.

The agonizing time lags between offshore discovery and production, between investment and payout, are not entirely the unavoidable result of the admittedly difficult environment in which we operate. On the contrary, I submit that, as an example, a doubled allowable at a double spacing would go far to relieve the problem, bring no more oil into the market, but would require just half the investment. Stated differently, it would cut the payout time in half!

Does it really make economic or engineering sense to drill six wells to drain a reservoir where one could do it about as well? Is it really "conservation" when we ignore the vertical dimension, use only an arbitrary area and shape, instead of volume in assigning allowable rates of production? Would we not be wise to stretch or change some of these traditional concepts in the interest of encouraging operators to drill for and develop offshore reserves which, under present rules, would never be economic and therefore, will be permanently lost?

I only ask these questions. I do not pretend to know their whole answers. I urge that those more qualified to consider them and are more vitally interested in their consequences to face up to them early and squarely. It will be difficult enough to solve the many technological problems we face in deeper waters offshore, but I am confident that we can do it. It will be longer and more painful if we must tackle them with one hand tied behind our back.

Platform "Hilda"



EXPERIENCE with "Hilda," a 24-well drilling platform working off California, has shown the design of the structure has versatility which can be adapted to other drilling conditions.

Hilda is an outrigger type of platform. The designation comes from the fact that it was towed to location on two of its four legs.

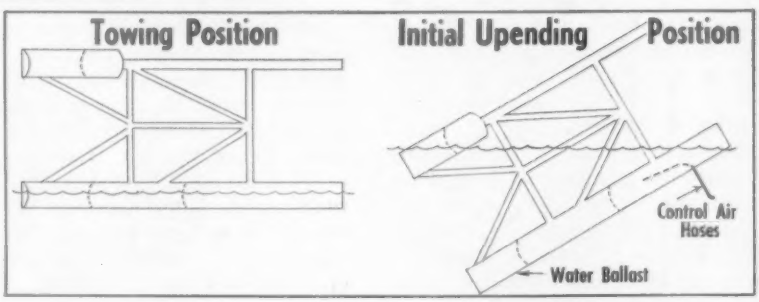
Those who helped design the platform say it has these possibilities:

- The design is adaptable to a light-duty operation where only one rig and a few wells are required as well as to a multiwell, two-rig operations such as the present design.
- For deep water a platform like Hilda that can be floated to location on its side has advantages over a platform that would have to be towed upright.
- The unit is drilling in 106 ft. of water, but was designed for 175 ft. and has potential for drilling in water 350 ft. deep.
- Capacity of the platform is 24 wells drilled from 2 rigs. But this could be expanded to 36 wells under certain conditions.

The versatility of Hilda is based on the experience Standard Oil Co. of California and Humble Oil & Refining Co. have had with the rig on their Summerland lease off Santa Barbara County, California.

C. M. Shields and N. B. Shumate, both of Standard of California, operator on the Summerland lease, outlined the development of Hilda at the recent API Division of Production meeting in Los Angeles.

Design. Hilda is the second of two platforms built on the Summerland lease. There are several major differences in the two structures.



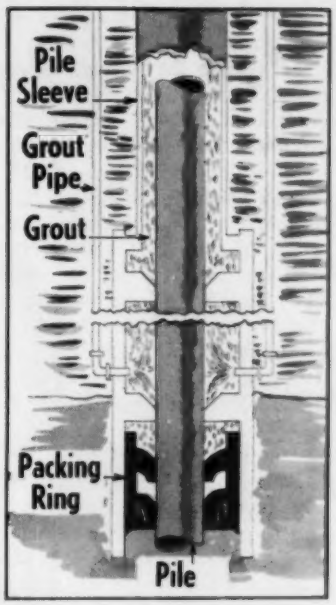
PLATFORM HILDA (above) is designed as a self-contained, multiwell unit for 175 ft. of water. Only one rig is shown in drawing. A second can be added if justified by field development. Advantage of outrigger design of Hilda comes when floating platform to location (right) and upending by controlled flooding of compartments in legs. Figs. 1 and 2.

is a versatile performer

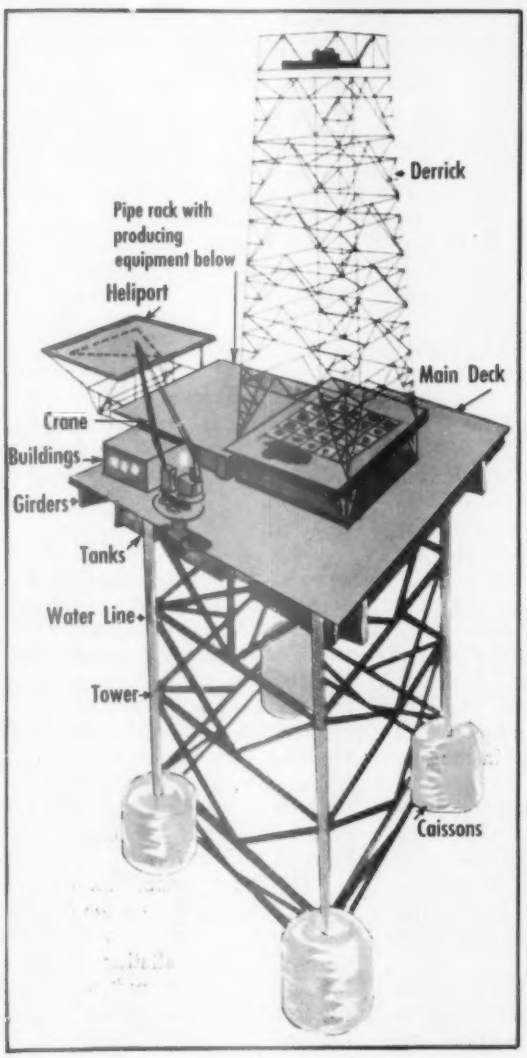
Unit, designed for 175 ft. of water, is now drilling in 106 ft. and has potential for 350-ft. drilling. Platform which can drill 24 wells on one location, can be expanded to 36 under certain conditions.

The outrigger type of platform came as result of a demand that a platform be designed for 175 ft. of water. Hilda was designed to meet this water depth and to handle 24 wells (Fig. 1).

Two of the platform's four legs are 16 ft. in diameter through the entire length. The other two legs are 4 ft. in diameter with a 14-ft.-wide caisson making up the bottom 40 ft. The caissons are sized to stabilize the tower during the upending and lowering operations. They also serve as a means of terminating piles at the ocean bottom by a grouting process to support the loads on the two small-diameter legs.

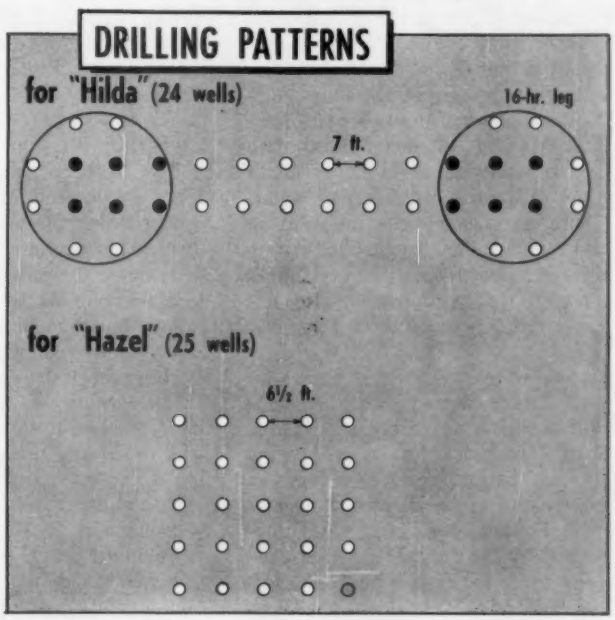


SLEEVES or tubular pipes in Hilda's 16-ft. legs serve dual purpose: Hold platform in position and as conduction pipe for wells. Fig. 3.



PLATFORM HAZEL was first built on Summerland lease. Design features 27-ft.-wide caissons on bottom of legs and stationary rig which drills two wells simultaneously. Fig. 4.

NEW WELL PATTERN was developed for Hilda. Essentially wells are in two parallel rows of 12 each with half of wells drilled through pipes in 16-ft. legs. Hazel's locations are in five rows of five wells each. Fig. 5.



The 16-ft.-diameter legs serve two purposes:

...During the towing, the structure floats on these legs. They are divided into compartments, which are flooded to land the platform upright on the ocean floor (Fig. 2).

...During drilling, 12 tubular piles are used as conductor pipe for the wells. The sleeves also serve as structural members for the columns. They are driven into the floor and grouted into position (Fig. 3).

The original 175-ft. water depth design later was modified for 106 ft., the depth in which the platform is working.

The first platform built on the Summerland lease is considerably different from the second. This first structure, known as Hazel, has four legs 3 ft. in diameter with 40-ft.-high caissons on each leg. The caissons are all 27 ft. in diameter (Fig. 4).

Hazel, which is drilling in 100 ft. of water, was towed upright to location and landed on bottom by flooding the caissons. A derrick barge was used in installing the structure, both for lowering it into position and in installing the deck.

There are no pilings on Hazel. The platform gains stability by the spread footings of the four caissons. The caissons also are filled with sand and concrete.

Why the difference. The much deeper water anticipated for Hilda was the primary reason for changing the design of the platform, but some other changes have been built into the structure.

Here are some of the major differences between the two platforms:

1. **Method of installation.** The outrigger design of Hilda is much more attractive for deep water. There are fewer risks involved in towing since the structure is floating on one side rather than standing upright. The outrigger also has fewer risks involved during installation.

According to Shields and Shumate, there were "fewer problems and much less anxiety with Hilda than Hazel even when comparing the installation of the two types in nearly the same depth of water."

2. **Foundations.** Hazel is supported by the four 27-ft.-wide caissons at a location where the soft overburden is 20 ft. deep. The overburden at Hilda's location is 40 ft. deep, which makes jetting the caissons to firm bearing unattractive in comparison with using piles.

Shields and Shumate point out this does not imply spread footings would necessarily be used with the outrigger design under shallow overburden conditions. The choice of foundation design would depend on site conditions and the intended function of the structure, but the outrigger design lends itself well to piles even if they must be drilled in.

3. **Deck arrangement.** The principal reason for changing the deck arrangement is that some of the wells on Hilda can be drilled through the two big legs. This automatically establishes a rig location. Hilda's deck is slightly larger than the other, running 120 ft. square compared to 110 ft. square for Hazel.

4. **Drilling equipment.** Hazel is equipped with a single stationary derrick to serve the 25 locations on the platform. Only one rig currently is running on Hilda, but the design is such that two rigs can run, one at each of the big legs.

A big difference in the two platforms is that two wells can be drilled simultaneously from the derrick of Hazel (OGJ, Feb. 23, 1959, p. 147). The wells are 6¼ ft. apart in a pattern of five rows of five wells each. Two wells can be drilled simultaneously from Hilda, but two derricks are required.

The derrick developed for Hazel has operated successfully, but the close spacing on the first platform led to such close control of hole deviation and straight-hole drilling that a new pattern was adopted for Hilda.

The 24 locations on the new platform are located in 2 rows of 12 each running the width of the platform. The locations are 7 ft. apart. This made it necessary to place 12 locations outside the big legs (Fig. 5) rather than bunch them in the legs as originally planned.

However, if drilling experience on Hilda permits the operator to eliminate the two-row design this could lead to drilling through the remaining six empty sleeves in the two legs and increasing the platform's well capacity to 36.

Standard of California has switched from an electric rig on Hazel to a diesel rig on Hilda, but the inability to get replacement parts as easily for an electric rig as for a diesel rig was the principal reason for the change. There also is a limited supply of electric rigs available on the West Coast.

Potentials. According to Shields and Shumate, Hilda is structurally sound in all respects and has proved more economical, particularly in the erection phase.

The design also has the potential of being used in water up to 350 ft. deep.

There are several possibilities for cutting the costs of the outrigger design. For example, if the sleeves and conductors were removed from inside the large-diameter legs, the legs could be smaller. Another possibility is reducing the deck size by using only one rig and possibly a tender.

Here's how the authors sum up the possibilities of modifying the design to meet conditions other than those off California:

"With fewer deck requirements for drilling equipment, the plan dimension of the tower could be reduced substantially consistent with stability requirements for economic foundation design.

"The weight reduction resulting from eliminating the conductors and decreasing the plan dimensions would allow a substantial decrease in the diameter of the large legs and still maintain adequate buoyance for towing and upending. These moves would result in lower wave forces. This should permit further weight reductions in structural bracing members.

"Under this approach, piles would be terminated around the periphery of the large-diameter legs, but still at the ocean floor. All wells would be exposeed to wave forces, which is the usual practice. Thus, the fewer the wells, the more attractive this approach would be.

"The main concern would be the vibration considerations resulting from a more flexible structure, particularly in deeper water. This may very well control the physical portions of the platform.

"The above possibilities are mentioned here to point up the fact that the outrigger concept is applicable for light-duty installation as well as the self-contained, multiwell, dual-rig operations now existing at Summerland."

ONE TENDER, two derricks, four rigs occupy site of Calco's Y-structure in Bay Marchand field. Though built in two sections to isolate rigs one from the other, platform is considered single unit. Producing wellheads are on lower deck.

Multirig platforms save for Calco

Four rigs can't operate as cheaply as one, but four rigs on one platform are cheaper than one rig on each of four different platforms. That's the experience of the California Co. at Bay Marchand off Louisiana's coast. Unit operating cost is kept low by running two drilling rigs and two completion rigs on one platform from one tender.

BY ED McGHEE
Drilling Editor

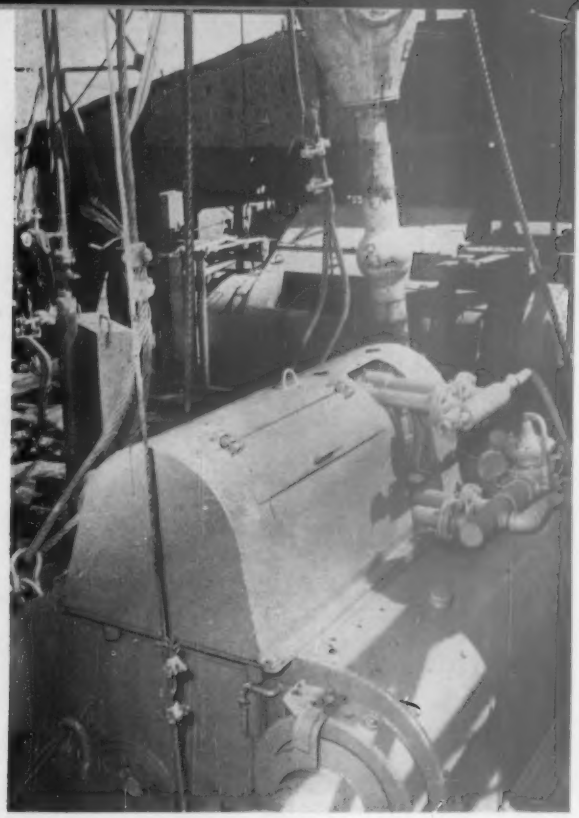
WHEN WE THINK of offshore drilling, the picture that usually comes to mind is a platform supported by one tender and carrying one rig. Old hands in the trade are aware that two rigs have sometimes worked on a single platform.

Imagine now **four** rigs operating from a single platform and supported by a single tender. This is already an accomplished fact. At Bay Marchand field off Louisiana, the California Co., division of California Oil Co., successfully ran four rigs simultaneously on one platform for a number of weeks. The company regularly operates three rigs at one time on a single platform with a single tender.

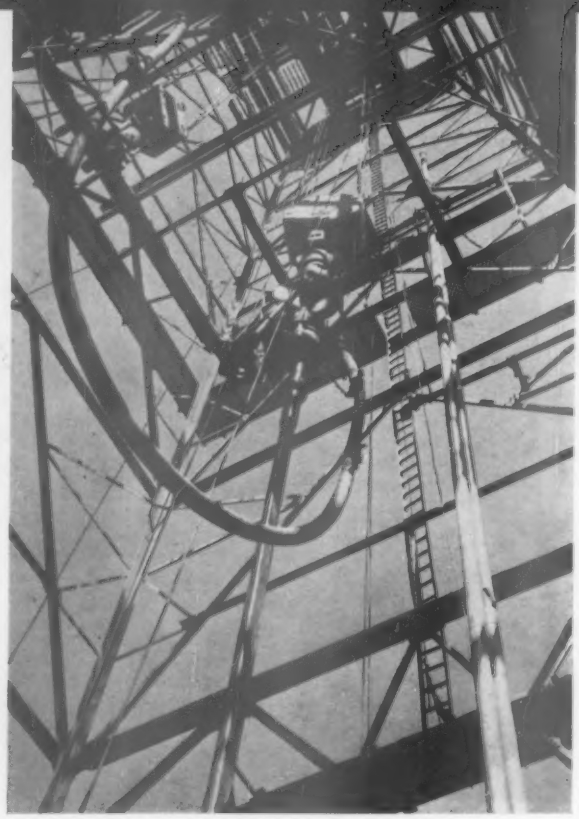
Two of the rigs drill new wells. The third (and fourth rig when needed) complete the wells or work them over.

By virture of these multiple-rig operations, the company profits in several ways:

1. The small rigs which complete the wells are much cheaper to operate than the large drilling rigs.
2. Considering the platform as a whole, the wells are brought into production sooner, starting cash income sooner.
3. Tender expense per well is lower.



COMPLETION RIG, DRILLING RIG work under same derrick, sharing same work area. Each has its own rotary; mud pump for completion rig is on drilling tender. Almost all equipment for drilling rig is on platform.



SECOND CROWN, TRAVELING BLOCK are strung into extra-wide derrick to allow completion rig to trip work pipe and tubing without interfering with drilling-rig activities. One crew can usually operate both completion rigs on a single platform.

4. Rental units, such as cementers and loggers, can be used on more than one rig.

5. Mud can easily be transferred from one well to another, thus saving on materials.

Calco freely admits that it finds operating three or four rigs a much harder task than operating only one. There is an endless and ticklish problem simply in coordinating all the work. As an example, pipe for one well can't be ordered to location too soon, lest it be racked on top of other pipe needed almost immediately on another well.

Even allowing for such an occasional slipup that may result, most believe Calco has made an important contribution to offshore-drilling methods. Calco, for its part, plans to continue multiple-well operations routinely in the future.

Reduced cost per well. The two rigs presently drilling off Calco's Y-structure in Bay Marchand are modern, 2,000 - hp., deep - drilling rigs typical of platform rigs working today in the Gulf of Mexico.

The completion rigs on the structure are considerably smaller skid-mounted draw works equipped with torque converters, and each is powered by 300-hp. engine drive. Incremental cost of operating the completion rigs on the structure is considerably less than cost of operating the drilling rigs, making possible large savings.

The first completion rig used at Bay Marchand went into operation in February 1960, and the success of this innovation can be measured by the fact that three more completion rigs were added during the first year. At present there are seven completions rigs at Bay Marchand.

Gained 4 months' production. In a recent 12-month period, one of Calco's completion rigs alone was able to add about 129 well-days of production to the volume of crude sold from Bay Marchand field. This 129-day figure is the cumulative time saved in completing five dual and five triple wells.

As soon as the drilling rig sets the producing casing, it spuds a new well, leaving the completion rig to bring the first into production. Thus, each new well is spudded and produced several days sooner. In the 12-month period mentioned, average completion time was 15 days. This means that the drilling rig was able to spud its second well roughly 15 days sooner than otherwise. Then, the third well was spudded some 30 days sooner. At the end of the year, total production time gained was 129 days. Since the wells are multiple completed, total extra oil produced in that time was about 250,000 bbl.

Two six-well derricks. On Calco's Y-structure, each of the two drilling rigs works under its own wide-crown six-well derrick. Each rig is completely independent of the other except for their being on the same platform and being supported by the same tender. Calco constructs its platforms so they carry all rig equipment including pumps, mud tanks, and pipe racks. The tender carries only supplies, housing, dry mud, and pipe not in use on the rig.

Each rig drills the first six of its wells by moving the crown block

and rotary table to successive new positions. Then, derrick and substructure are skidded a few feet to clear the completed wells and then the second six wells are drilled.

The completion rig works under the same derrick as the drilling rigs but a separate crown block is provided and a separate rotary. Pumps and tanks for the completion rig are carried on the tender. All rigs use the same type mud system (a gyp mud currently) for simplicity in control and supply.

Drilling crew and completion crew work on the same floor at the same time without serious interference. The crews must become accustomed to the distracting influence of others at work nearby. However, there has been no serious safety problem and no appreciable loss of efficiency.

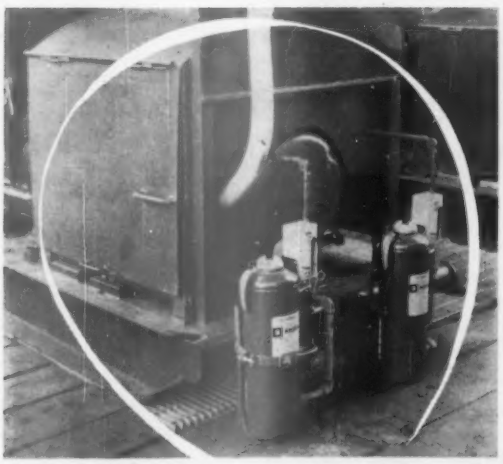
The completion rig works on only the first five of the six wells drilled before the substructure is skidded. After the sixth well is at total depth, the drilling rig cannot spud another without skidding. So, since it is faster than the completion rig, the drilling rig completes this sixth well to save time.

Two for two. It is now Calco's practice at Bay Marchand to install one completion rig with each drilling rig on a development platform. Where two drilling rigs operate from one LST tender, there would also be two completion rigs, but since the completion rig operates fewer than half the days that the drilling rig operates, one set of rig crews alternates between the two completion rigs and keeps up with the two drilling rigs. In the event of extensive testing or other completion difficulties, another crew can be added to operate both completion rigs.

Logistics problem. Of the problems that arise from multiple-rig operations, the biggest is transporting equipment and materials to the location, storing these things, and handling them. At times, for example, there has been as much as 66,000 ft. of tubing, 20,000 ft. of casing, 30,000 ft. of drill pipe, and 20,000 ft. of work string on a single platform and its tender at the same time. All this pipe must be available in the order it will be needed.

Naturally, there sometimes arise occasions when operations conflict either on the tender or on the platform. In such cases, the drilling rigs always have priority since their operational cost is higher. A case in point is mud. All mud mixing is done on the tender since mud materials are stored there. Thus, when mud must be weighted up, it is pumped to the tender, processed, and pumped back to the platform. Seldom is there a conflict in this process between the two drilling rigs. However, there was sometimes a conflict with the completion rigs since they used the same pumps for circulating that were used to mix mud on the tender. But this problem has been corrected on subsequent platforms.

Fire protection for offshore electric generators



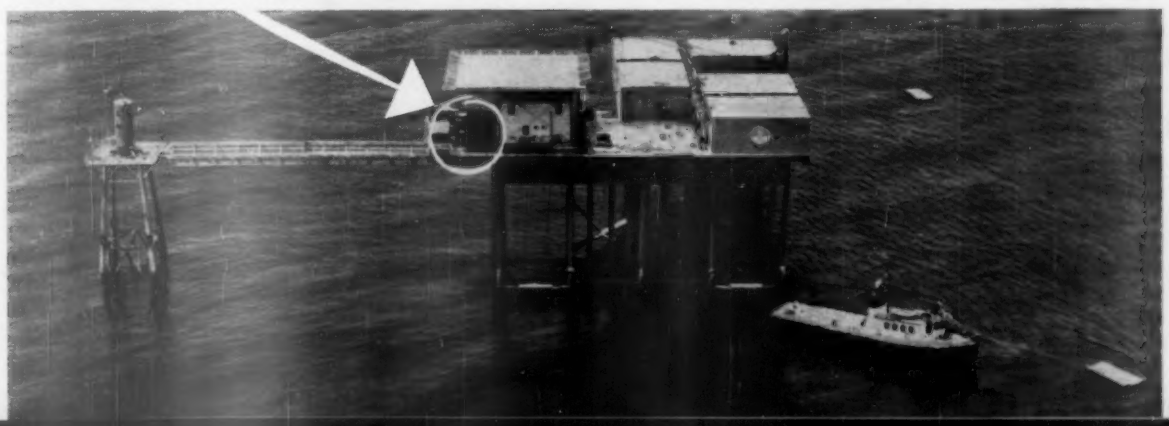
THESE TWO TANKS each contain 30 lb. of dry chemical to provide fire protection for the diesel-driven generators on Sinclair Oil & Gas Co.'s platform in the Gulf of Mexico.

Primary fire-protection system for platform comes from electrically driven pumps handling water from the gulf. In case of damage to the generation system, there would be no protection available, so Sinclair is using this dry-chemical protection for the primary power source.

In case of fire, an automatic triggering device floods the generator housing with dry chemical from these tanks through four nozzles inside the housing.

Designed by Ansul Chemical Co., Marinette, Wis., the system can be installed easily by regular maintenance crews, and can be returned to service quickly after a fire has been extinguished.

Location of the diesel-driven generators on the platform is shown in the photo.



CONCRETE-PILE SPLICE STARTS (left) after lower section has been driven into the bottom. Upper section is now stabbed into lower and the spliced whole will be driven to proper level. Care is necessary in driving lower section so that upper surface is not deformed to prevent splicing. Completed concrete-pile platform (right) stands in Eugene Island Block 18 field. Concrete piles give corrosion resistance necessary to long producing life. Splice area of piles is below mud line.

Spliced concrete piles fill offshore construction gap

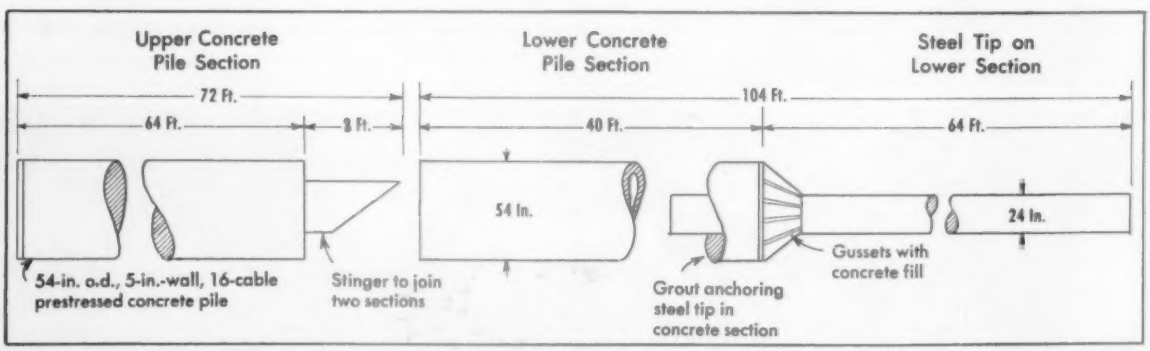
The combination of shallow offshore water and long concrete piles presented construction problem for Shell Oil in erecting a platform. Since shallow-water derrick barges couldn't handle the piling in a single piece, piles were made in two sections and then spliced together on the job. Result was inexpensive, effective platform support.

BY ED McGHEE
Drilling Editor

HOW DO YOU install long concrete piles where water is shallow? Derrick barges large enough to handle the long piles in one piece have draft too deep to come into the shallow water.

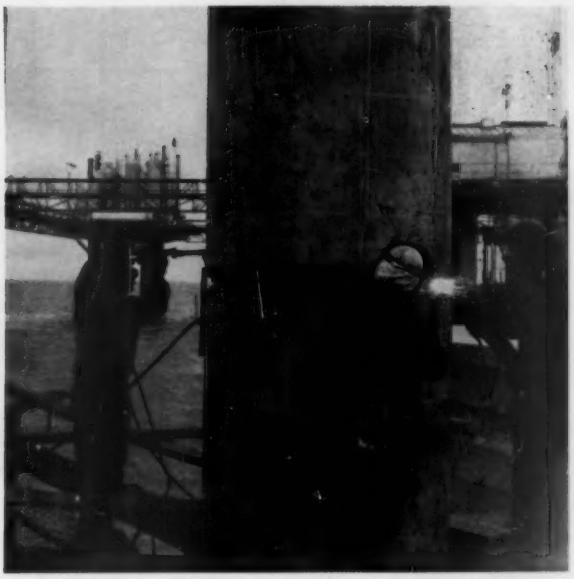
The problem is simple with steel piles; you make the pile in two pieces short enough to be handled by a small, shallow-draft derrick barge. You drive one section, weld the second section atop the first, and then drive the spliced pile.

Shell Oil Co. was faced with the long-pile, shallow-water dilemma in Block 18 field in the Eugene Island area off Louisiana. Problem was that Shell wanted to use con-



WHEN JOINED, TWO PILE SECTIONS make single pile length of 168 ft. Steel tip on end is steel and smaller than pile proper; thus the tip can more easily penetrate resistant formations and be driven to good foundation strata.

LOADED ON BARGE, ready for sea is lower section of 54-in.-o.d. concrete pile with its 24-in. steel tip. Piles are prestressed, centrifugally cast. Over-all length of this lower section, 104 ft., is about all shallow-draft derrick barge could handle.



STEEL CASTINGS in concrete pile sections are welded together to complete splice. Regular steel piles have been spliced in this way for many years; this is first time splicing technique had been applied to concrete piling.

crete piles for their superior resistance to corrosion. And no one in the offshore oil industry had ever spliced concrete piling.

Result: Shell engineers got together with Raymond International Concrete Pile Co. and came up with a method to splice concrete piles. The two-part piles were fabricated and installed to support production platforms in Block 18 at a point where water is only 8 ft. deep. Length of the installed pilings was up to 168 ft.

Moreover, fabricating and installing the two-piece piles in shallow water with a small derrick barge was not especially expensive. Cost was little more than using single-piece piles with a large barge in deep water.

No shallow support. Purpose of the Block 18 work was to support a 10,000-bbl. cone-bottom bolted tank. It was to be installed on a concrete platform 70 ft. in diameter. With this arrangement, and usual construction, the loading on each pile would be relatively heavy.

All other platforms in the area had driven piling to be supported by a Pleistocene clay 68 ft. below mud line. As a result of soil borings, Shell engineers felt this formation has too little resistance to support the heavily loaded storage platform. Unfortunately, the clay does offer great resistance to driving of piles.

A sand formation 133 ft. below mud line was known to be reliable enough for the platform foundation. So, it was decided to drive piles through the clay and into the sand. To do this, Shell brought in another little-used design, the steel tip for a concrete pile. The small-diameter tip would be easier to drive through the resistive clay than would a full-diameter concrete pile. Still, the tip would find sufficient support in the sand strata.

Considering the shallow water and the driving problem, company engineers decided on a pile of three distinct sections: the steel tip, the lower concrete pile, and the upper concrete pile. For field installation, the tip (64 ft. long) and lower concrete section were joined to make a column 104 ft. long. The remaining upper concrete section was slightly over 72 ft. long, including an 8-ft. "stinger." When spliced, resulting over-all length was 168 ft.

The steel tip was 24-in. diameter and the concrete sections 54-in. diameter.

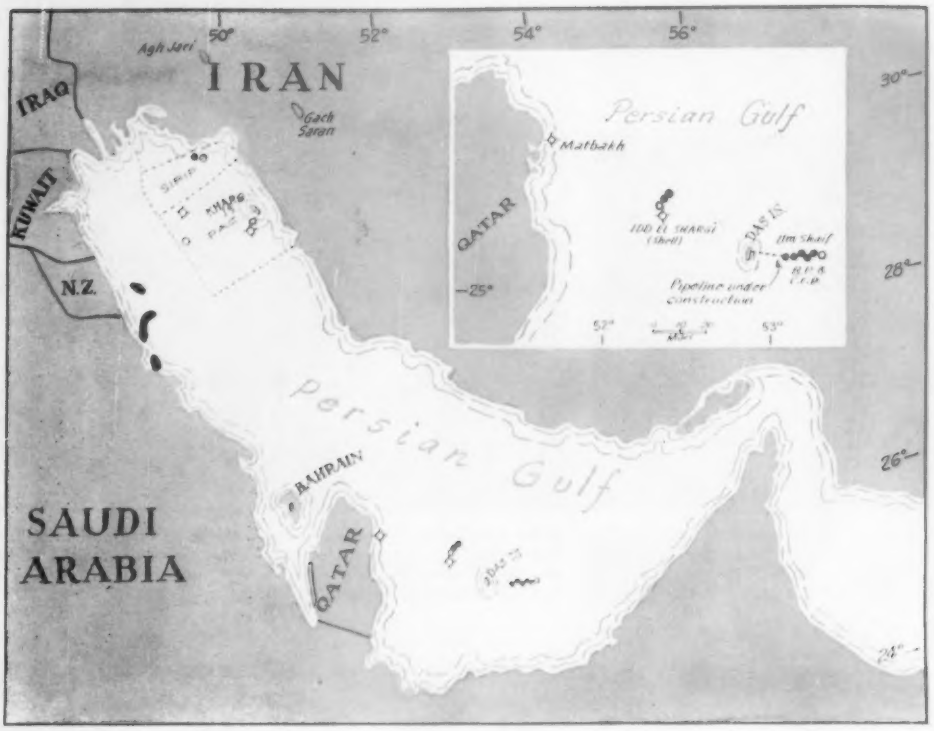
Welded together. The concrete sections were fabricated from centrifugally cast joints, prestressed with steel wires. On top of the lower section a flat steel ring was cast into the pile. A corresponding flat ring was placed on the bottom of the upper section. Purpose of the rings was to allow lower section to be welded to upper section in the same manner that two sections of steel pile would be welded.

In addition, an 8-ft. stinger was added to the upper section to fit down inside the hollow bottom section. This stinger would serve both as a stabbing guide and a means to strengthen the splice.

On location, the lower concrete section with its steel tip was driven into the bottom. During the driving process, care was taken not to damage the steel ring which topped the section. Then, the upper section was stabbed into the lower and the steel rings were welded together to splice the two. This weld area is driven below the mud line and, as a result, is not subject to excess corrosion.

The spliced pile was then driven to refusal, and any excess length cut off.

After the deck section was installed and the 10,000-bbl. tank mounted on it, this tank was partially filled with water to test for leaks. Weight of the water load was about equal weight of a full tank of oil. Thus, the piling was loaded to the maximum anticipated service load.



SITE of some of most spectacular success, most dismal dry holes, the Persian Gulf already boasts world's largest offshore field at Safaniya. Results generally have been better along southern shore, and poorer along Iran coast.

World-wide offshore drillers "bullish"

. . . *despite failures sprinkled among successes*

Big-time oil is the payoff for some of the drillers in the Persian Gulf and the Gulf of Paria. Disappointment is the lot of others. This report spots the significant finds and failures in these waters and such other areas as the Sea of Japan.

BY PAUL SWAIN
International Editor

LARGE-SCALE and expensive disappointments in offshore-drilling operations around the world this past year haven't killed the lure of marine drilling.

The international sea-water fraternity within the oil industry is growing bigger all the time.

Two groups of companies met costly failure in widely separated marine areas last year. If the failures dimmed enthusiasm, it wasn't apparent late in 1960 when Royal Dutch-Shell offered Kuwait a mammoth $84,000,000 bonus for drilling rights in the Persian Gulf off the little desert shaikhdom.

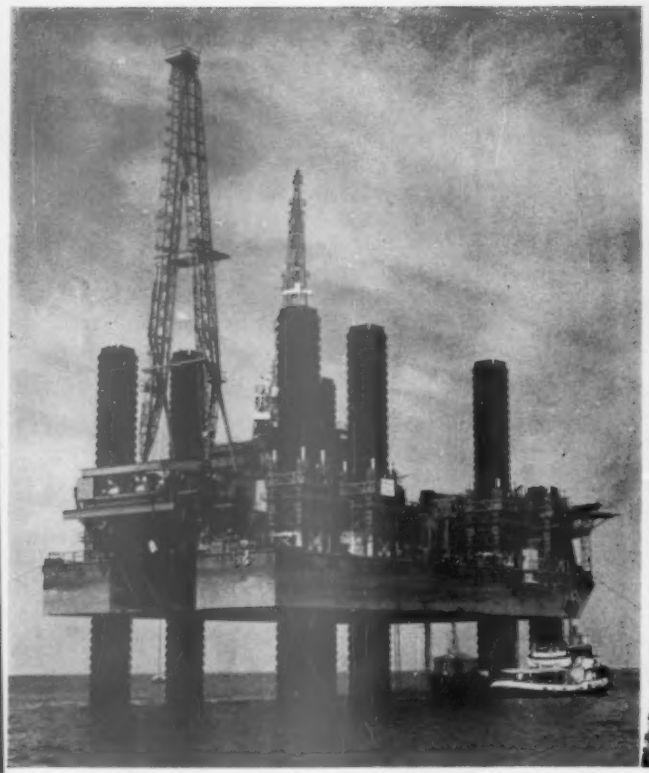
The Gulf of Paria has been a definite disappointment to the five-company combine which gave $100,000,000 for drilling rights in the Venezuelan waters. Iran's offshore regions in the Persian Gulf have failed, so far, to live up to the hopes of the companies drilling there.

But, marine drilling continued to chalk up success in the Sea of Japan off the main home island of Honshu, on the Trinidad side of the Gulf of Paria, and along the western and southwestern shores of the Persian Gulf.

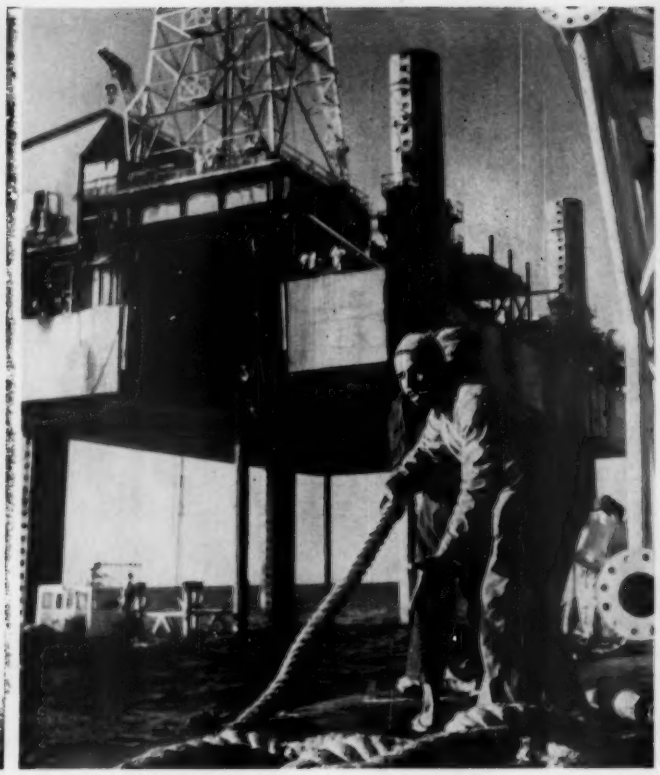
Persian Gulf. Most notable successes scored by ocean drillers continue to come in the steamy waters of the Persian Gulf.

These waters cover what is now conceded to be the biggest offshore oil field in the world, Arabian American Oil Co.'s Safaniya field.

Aramco drilled only four delineation wells in Safaniya last year, but the company doubled the size of the field. Aramco doesn't discuss such a possibility, but it is almost certain that Safaniya extends northward across the seaward boundary between Saudi Arabia and the Saudi Arabia-Kuwait Neutral Zone. Across that still-undefined boundary the



SEASHELL DEVELOPS APPARENT DISCOVERY at Idd El Shargi. This $5,000,000 self-elevating drilling barge is replacement for unit sunk 4 years ago by freak storm in the Persian Gulf. Shell has not announced details of its discovery.



WELL JACKET ARRIVES to protect wellhead of newly completed well. Abu Dhabi Marine Areas, Ltd., owned by British Petroleum Co. and Cie. Francaise des Petroles, has successful production here at Umm Shaif, is building pipeline to Das Island for loading.

Japanese have drilling rights and are rapidly developing their own oil field.

Safaniya produced an average of 181,000 bbl. daily last year from 20 wells on production. Another 15 are shut in. Productive capacity of the field is being increased to 240,000 bbl. daily with new offtake facilities, including a new 30-32-in., 16-mile pipeline loop linking it with Khursaniyah where the flow enters a 30-in. line to Ras Tanura. Aramco originally planned to move production from both Safaniya and Khursaniya through the same line, but increased demand for the heavier Safaniya crude made the additions necessary.

Drilling at Safaniya has been suspended since last December when the company's veteran drilling tender, the Queen Mary, swamped in rough seas and sank while preparing to drill 39 Safaniya. The company decided against making extensive repairs to the barge even though it was successfully refloated. Instead Aramco paid $1,350,000 for the idle Carl B. Anderson, a self-contained drilling barge which had been used to drill seven wells in the Gulf of Mexico.

Renamed the ADT-1 (Aramco Drilling Tender-1), the barge was towed from New Orleans to the Persian Gulf and is now ready to resume operations in Safaniya. Limited repairs were made on the Queen Mary and it will be used only for workover operations in the field.

South of Safaniya, the company is continuing development drilling on its second offshore field, Manifa, using a LeTourneau-style mobile drilling barge. Manifa now has seven wells but is still not defined. Last year wells on the southwest and southeast flanks of the structure extended the field. It is now at least 15 miles long and 9.5 miles wide and productive from six reservoirs. The field has not yet been put on production.

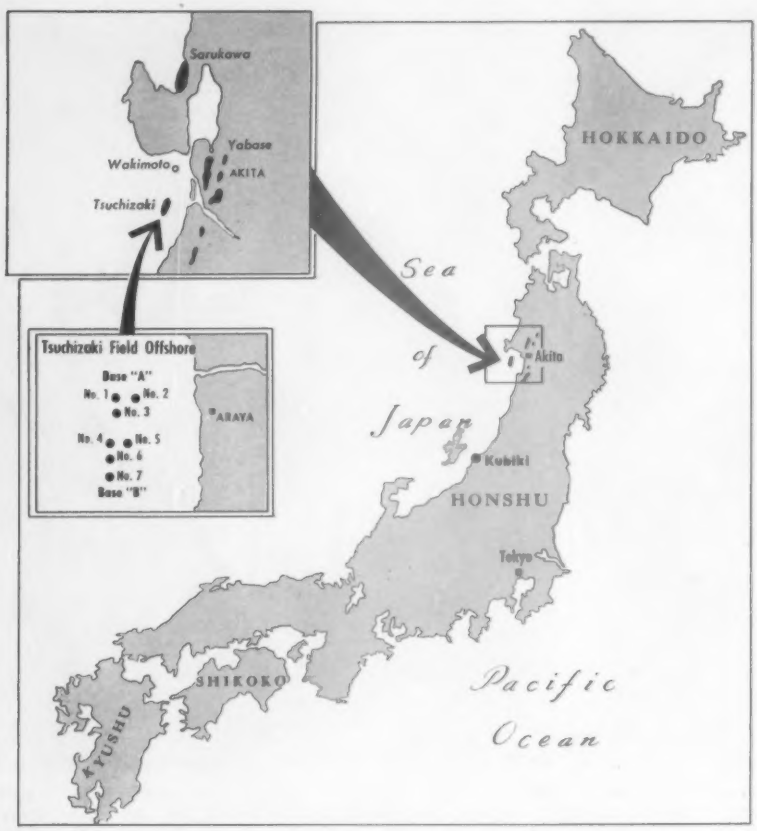
The Japanese. About 25 miles northeast of Safaniya and about the same distance from the Neutral Zone coastline, the Japanese-owned Arabian Oil Co. is rapidly developing its Khafji field which produces a similar crude to that of Safaniya.

The Japanese, with two American drilling contractors doing the work, have made rapid progress getting the field in production, but they have had two costly blowouts and fires.

The 1 Khafji blew out, burned, and destroyed a rig in August 1959 before the blaze was finally controlled. This well was reentered, deepened, and became the field discovery producing about 6,000 bbl. daily. The company hasn't been so lucky with its latest mishap.

The 15 Khafji blew out in the same shallow, high-pressure Eocene gas zone at about 1,700 ft. on April 28. With the fire still out of control on May 12, Arabian Oil Co. decided to abandon the well and the badly damaged Seacat Drilling Co. equipment. An International Drilling Co. rig, at work on 16 Khafji, will be used to drill a relief hole in an attempt to kill the well.

In spite of the mishaps the Japanese company has already estab-



SUCCESSFUL OIL FIELD off Japan home isle of Honshu is encouraging Japan Petroleum Exploration Co. to step out. Company anticipates dual completion in vicinity of Tsuchizaki play. All drilling is from LeTourneau type mobile barge.

lished a sizable oil field, and with the help of temporary loading facilities sent its first shipment of 126,000 bbl. of crude to Japan.

The company hopes to move between 10 and 15 million barrels of Khafji oil to Japan before the end of the company's fiscal year, March 1962. Shipments should rise sharply in 1963 when permanent shipping facilities designed to handle 200,000 bbl. daily are completed onshore.

Shell off Qatar. Shell Co. of Qatar has cautiously declined to make any "commercial" predictions about its Idd El Shargi discoveries, 52 miles east of Qatar, but the fact that the company has completed two wells on the structure and is drilling a third would indicate it is another Persian Gulf oil field.

The Shell company was one of the first to try and probe the waters of the Persian Gulf, but its first two tests of the offshore concession were dry. Then a freak storm destroyed the drilling barge and caused a 3-year delay in operations while a replacement was being built in the Netherlands at a cost of $5,000,000.

The 2 Idd El Shargi, the first well for the new Seashell platform, found Middle Jurassic oil. Shell has never divulged test figures on the well, but the company later completed No. 3 just 1¼ miles away and is now drilling on No. 4.

Umm Shaif field. To the east of the Shell Qatar operation, a joint British-French company is developing a successful oil field on an offshore concession granted by the Shaikh of Abu Dhabi, one of the Trucial Coast shaikhdoms.

Abu Dhabi Marine Areas, Ltd., owned two-thirds by British Petroleum Co. and one-third by Cie. Francaise des Petroles, completed its first Umm Shaif well in 1958 flowing 2,400 bbl. daily of 40°-gravity crude from a Lower Cretaceous limestone found at 5,500 ft.

Since that time the company has completed four more wells and is now drilling 6 Umm Shaif. All were drilled from the Adma Enterprise, a mobile drilling barge built especially for use in the Persian Gulf.

The company is now linking its field by a 20-mile submarine pipeline to terminal facilities at its base camp on Das Island, a remote little speck of earth 50 miles from the Arabian Peninsula mainland.

Off Iran's shore. On the opposite side of the Persian Gulf the box score is not so good.

A joint Italian-Iranian company has apparently made a marginal—by Middle East standards—discovery near the head of the Persian Gulf off Iran. Soc. Italo-Irania dei Petroli (SIRIP) has completed one well from a permanent platform in 18 ft. of water and about 6 miles from shore and is now drilling a second deviated hole from the same structure. The first well tested about 3,500 bbl. daily.

The company has shipped at least one tanker of the crude produced in tests from the first well to Iran.

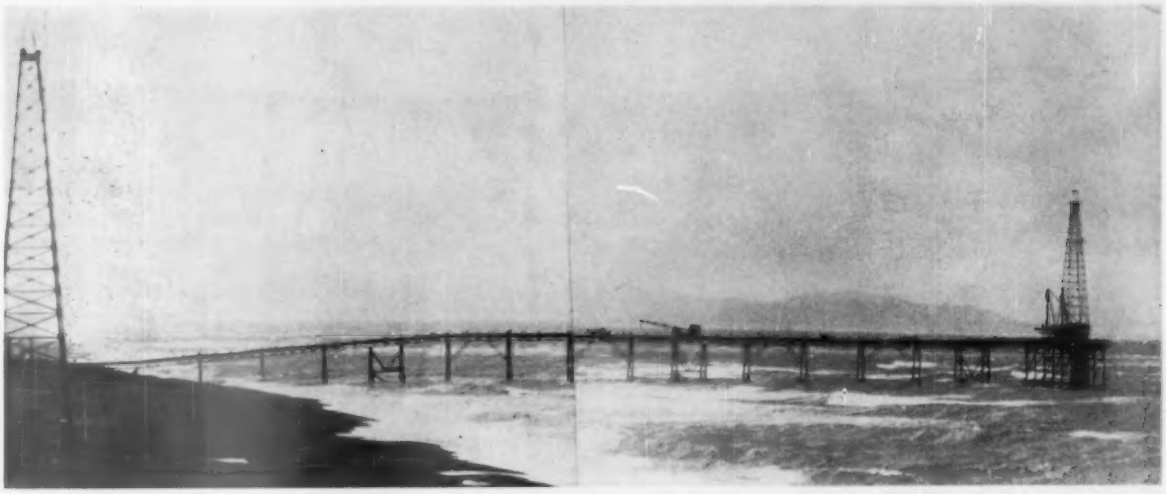
SIRIP was formed after Enrico Mattei, head of the government-owned Ente Nazionale Idrocarburi, offered the Iranian Government an equal partnership in his venture in order to get the 2,160-sq.-mile offshore concession. Once commercial production is established the Italians will split profits first with National Iranian Oil Co. and then again with the Iranian Government. The deal offered by the Italians gave birth to the so-called 75-25 split in the Middle East.

SIRIP is now preparing to spud a test on a second location with a new Italian-built mobile drilling platform called the "Gatta Selvatico" which just arrived in the Persian Gulf.

The platform was built by an ENI affiliate, Nuovo Pignone, under an agreement with R. G. LeTourneau, Inc., Longview, Tex. The triangular-shaped, 2,000-ton barge has 178-ft. legs and is equipped with an Ideco-Pignone rig rated for 20,000 ft.

Pan Am strikes out. To the south of the SIRIP concession, Pan American Internationed has had less luck.

When the Indiana Standard subsidiary moved into the Persian Gulf oil play 4 years ago the company offered Iran a $25,000,000 bonus



JAPANESE GAS FIELD MOVES OFFSHORE as pile-type platform is put into the Sea of Japan. Several wells have already been completed from this structure which extends field previously discovered onshore. Kubiki field gas will be used for fuel in Tokyo.

and agreed to spend $82,000,000 on exploration within 12 years. In return it was awarded a 6,180-sq.-mile concession. Like the Italians, the American company offered National Iranian Oil Co. a full partnership in Iran-Pan American Co. (IPAC) with the provision that NIOC was not to participate in exploration costs.

The first IPAC well was drilled in 129 ft. of water 80 miles from shore with a standard DeLong-type mobile barge equipped with an Ideco E-2500 rig. Spudded in October 1959, this well was abandoned last month at a total depth of 13,151 ft. after weeks of extensive testing. IPAC said only that it was being suspended as noncommercial.

The second IPAC well was spudded 21 miles south of Kharg Island in May 1960 in 142 ft. of water from a permanent platform served by a McDermott tender. It was abandoned almost a year later at a total depth of 13,497 ft.

Two new locations have now been selected by IPAC and the drilling units are both rigging up. The DeLong barge will drill a test south of the first wildcat and even farther from shore. The platform has been set in 135 ft. of water.

A fourth test, in 150 ft. of water, will be drilled from a permanent platform only a short distance south of Kharg Island.

The Kuwait concession. The coup of the year was staged by Royal Dutch-Shell in walking away with the biggest exploration prize in years. Shell, competing with seven other companies offered the Shaikh of Kuwait $84,000,000 bonus and the chance at 20% participation in the operation for a 45-year concession on 1,500 sq. miles of Persian Gulf waters off Kuwait.

The company has already started seismic work and plans to drill its first test of the concession early next year.

The subsea area off Kuwait is easily the choice prospective oil area of the world. In spite of the fact it has never been touched by a drill bit, it is regarded as semi-proved. It lies just to the north of the region where both the Japanese and Aramco have already established sizable offshore oil fields.

Sea of Japan

With a small producing offshore oil field already under its belt, Japan Petroleum Exploration Co. began work this spring to expand it.

Japex completed six successful wells at Tsuchizaki, off Akita in the Sea of Japan, before winter weather forced a shutdown. Four of the six producers were drilled directionally from two central locations, all with the $3,000,000 LeTourneau mobile barge, Hakuru (White Dragon).

The small field, linked by 4 and 5-in. gathering lines to an onshore tank farm at Araya, is now producing 950 bbl. daily. The crude is moved from the tank farm by rail to Japanese refineries.

In mid-May this year, Japex moved the White Dragon out of Akita Harbor for a third location, half a mile south of the discovery. Here the company plans two, and possibly three, additional directional wells, after the first test is completed.

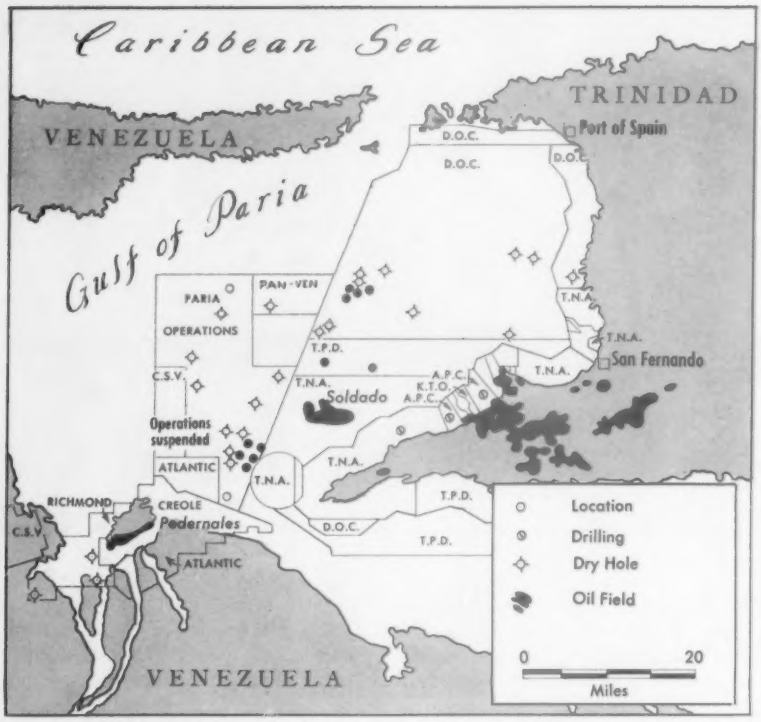
Total depth of these wells will range from 2,000 to 4,800 ft. with all of them aiming at the upper Katsurane sand which is found at about 1,800 ft. Some of the earlier wells at what Japex calls "Base A" and "Base B" tested as high as 1,900 bbl. of oil and 350 M.c.f. of gas daily through a 1½-in. choke.

The third group of directional holes will be called "Base C" wells and will be connected by gathering lines to the first two bases and then to the shore tank battery.

At "Base D," to the south, the company plans later this year to try a dual completion in a 6,000-ft. test which the Japanese hope will find both the shallow Katsurane sand and two Yabase formations productive. They found good oil and gas shows in the Yabase zones between 3,400 and 4,000 ft. and 4,280-4,350 ft. in one well drilled last year from the locations to the north.

All these are regarded as stepout wells for Tsuchizaki field. The only wildcat planned offshore for this year by Japex will be a 6,500-ft. test to be drilled later in the year off Wakimoto, north of the Tsuchizaki region.

Kubiki gas moves offshore. In an



THE GULF OF PARIA, Trinidad's best hope for more oil production, is losing some of its luster as a marine hunting ground. The Venezuelan side is a distinct disappointment. A $123,000,000 five-company program found oil, but not in commercial quantities, so operations were suspended.

entirely different type of offshore operation, Teikoku Oil Co. is literally following its Kubiki gas field into the sea.

Teikoku Oil built an $830,000 McDermott-type permanent platform 990 ft. off Ohkata-machi in Niigata prefecture to develop that part of a sizable gas-producing structure which extends into the Sea of Japan.

This "man-made island" was completed late last year and the first test drilled from the 5,400 sq. ft. platform tapped a new producing zone. The company plans to drill another seven or eight wells from the platform.

The company has 32 wells on production in the field, discovered in 1959, with a daily output of 18,000 M.c.f. of gas and about 630 bbl. of liquids. The producing company is negotiating a deal to sell the gas to Tokyo Gas Co. for sale in Tokyo as household fuel. A 200-mile, 12-in. pipeline to Tokyo would furnish about one-quarter of the utility's present gas needs in the city for space-heating purposes.

Gulf of Paria

The Gulf of Paria, which separates Venezuela and Trinidad, is losing some of its bloom as a marine oil-hunting ground in spite of the fact it is Trinidad's best hope for more oil production.

The Venezuelan side of the gulf has been a distinct disappointment. Six months ago a five-company combine that has spent $123,000,000 in an exploratory program in Venezuelan waters suspended operations. The group, Paria Operations, found oil, but not in commercial quantities. The whole future of the operation is still up in the air.

The east side of the gulf still is most likely source of additional reserves for Trinidad. Land operations on the island, marginal by world-wide oil standards for years, show no signs of improving. Seaward extensions of existing fields and development of marine oil fields offer most promise of maintaining Trinidad's historical place as an oil producer.

The Venezuelan side. After drilling 20 tests, 6 of them completed as small producers, Paria Operations suspended operations on the Venezuelan side of the gulf early this year. The group is at present trying to evalue what it did find and determine whether or not to continue an expensive exploratory program.

The Paria combine (Ohio Oil, Texaco, and Continental, each with 25%, and Cities Service with 16⅔% and Richfield with 8⅓%) paid Venezuela bonuses of $101,000,000 for six blocks of acreage during the 1956-57 rush for new concessions.

With Texaco personnel largely staffing Paria Operations, the five companies poured another $22,000,000 into its program between 1958 and early this year. Six small producers located about 10 miles west of Trinidad's Soldado marine field were completed, but output from the half dozen wells was so low the whole operation was suspended.

If the operation is to be resumed at all, the companies have not revealed any such plans.

The Trinidad side. Life hasn't been exactly peaches and cream for the oil hunter on the Trinidad side of this body of water, but here the results haven't been quite so discouraging.

Soldado field, 14 miles west of Trinidad's Point Fortin jetty and just a little more than 7 miles from the international boundary, is still the first and best marine field in area.

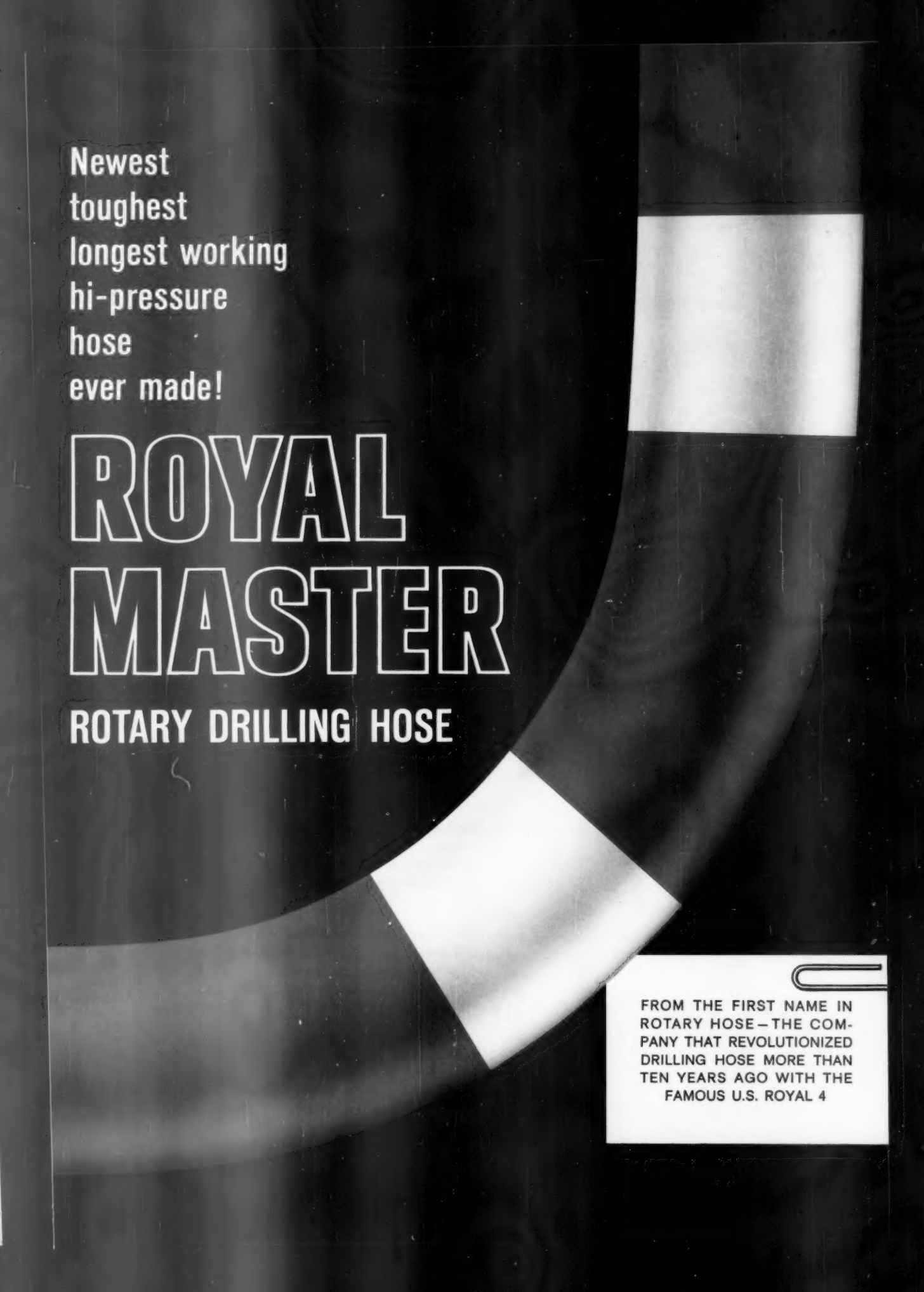
Trinidad Northern Areas, Ltd., owned by British Petroleum, Trinidad Shell, and Texaco Trinidad, drilled another 23 development wells in Soldado last year and jumped the field's average production to about 21,000 bbl. daily. The three-company combine is using both a mobile barge and fixed platform drilling in the field.

Outpost wells, drilled in an effort to extend the east-west limits of the field, were only partially successful. TNA completed three of four tests on the west flank of the field, but only found one producer in a pair of eastward extensions.

Almost due north of Soldado on a strip of marine concession held by Trinidad Petroleum Development Co., Ltd., another subsea discovery is still to be evaluated.

The British Petroleum-controlled company has drilled two apparently commercial wells, but additional drilling will be necessary to determine if the find is significant. The

(Continued on Page 107)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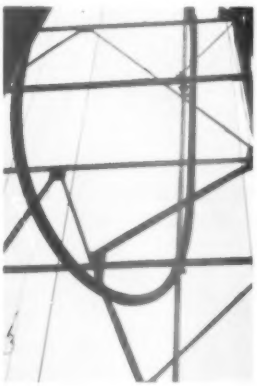

Making hole at rates as high as 500 feet an hour on an offshore barge for one of the nation's leading drilling contractors, the new Royal Master has demonstrated exceptional toughness, together with a degree of flexibility during this fast drilling that made it difficult for the driller to believe he was actually working with such a strong, high-pressure, long-working-life hose.

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2 North Marine, drilled 6½ miles west of the discovery, came in for 1,000 bbl. daily, but dropped off rapidly.

Both tests were drilled from a 2,200-ton drilling barge built in Germany especially for the operation. British Petroleum said only a few weeks ago that it plans to spend another $1,000,000 during the rest of this year drilling three more North Marine area wells.

Farther to the north, Dominion Oil Co. (Standard of California) has established a small four-well field at South Domoil, the first ever discovered from a floating drilling barge.

The 1 South Domoil, (30 miles southwest of Port of Spain and 20 miles north of Soldado) was not only the first discovery drilled from a floating barge, but the deepest hole dug with this kind of equipment. It went to 11,337 ft.

Drilling from a 240-by-72-ft. barge with a 12-ft.-diameter well cut through the center, Dominion completed three more South Domoil wells. Last year the wells produced almost 600 bbl. daily from a sand found between 8,500 and 9,300 ft.

Dominion has still not solved the problem of completing marine wells from the floating drilling barge. All the South Domoil wells were shut in at the ocean floor after testing and then completed at the water surface using a jackup-type rig which was brought in to do the job.

The company drilled two dry holes in an effort to extend the field and also accounted for two more dry wildcats in tests of other parts of the marine concession area it holds.

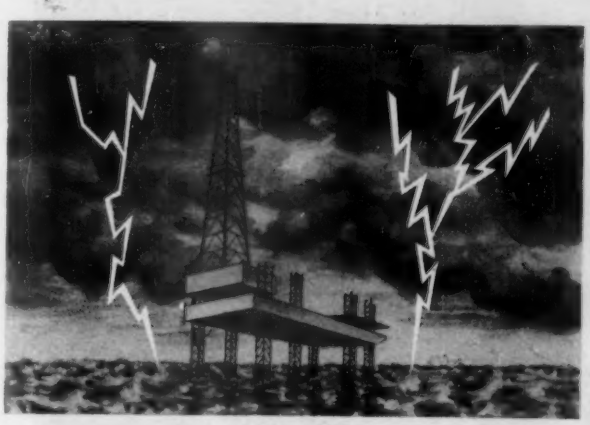
Closer inshore, Texaco extended its old onshore Brighton field farther out into the gulf with another 18 wells from a multiple-well platform. Another four stepout wells were drilled with a mobile barge. This is an extension of the seaward progress started in 1958 when Texaco drilled the first Brighton offshore well as a deviated hole from a shore location.

Kern Trinidad Oil (since bought by British Petroleum) was the hard-luck Trinidad company in the last year of marine operations. Kern drilled five tests on its small offshore license. Three were abandoned as dry holes, a fourth was left with stuck pipe after a blowout, and the fifth produced little.

New Trinidad concession. The biggest exploratory development of the Trinidad area came just a few months ago when a three-company group—all newcomers to Trinidad—were awarded a license to look for oil in Trinidad waters outside the Gulf of Paria proper.

Pan American International (Indiana Standard), Pure Oil Co., and Sun Oil Co. teamed up to take on an untested area to the east of Trinidad that is bigger than the island itself. The companies are equal partners in the venture and Pan American will be the operator.

The offshore concession lies beyond the 3-mile limit southeast and east of Trinidad in waters that range from 50 to 600 ft. deep. The group agreed to spend $500,000 this year and about $1,000,000 each year for the initial 10-year period of the license unless the 3,120-sq.-mile area is reduced in size.



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OUTBOARD MOTORS hold CUSS I steady on location during Guadalupe Island practice Moholes. The combination steering-propulsion units are located fore and aft on each side. CUSS I pipe is racked on deck not stood in derrick during trips; racking is automatic. Fig. 1.

BY ED McGHEE
Drilling Editor

PRACTICE MOHOLE in 12,000-ft. water off west coast of Baja California near Guadalupe Island. Location of Mohole itself has not yet been decided but may be in Caribbean. Aim is to find location where earth's crust is thin so drilling cost will be low.

Project Mohole: Full of promise for offshore oil hunters and deep drillers

A free gift of research and development is the oil industry's likely harvest from scientists' attempts to drill Mohole. In this drive to push a hole deep enough to sample the earth's mantle rocks, there are certain to be valuable lessons in deep-drilling techniques and in offshore-operation methods. Practice holes recently completed were resoundingly successful.

THERE SEEMS little doubt now. Mohole will be drilled. The resounding success of practice runs offshore from California and Mexico gives real momentum to the preparations being made for the deep hole itself.

While this attempt to sample the earth's mantle is certainly no conscious effort to add treasures to oil's storehouse of knowledge, the end result will be just that. Since Mohole is to be a record-depth hole drilled in the ocean, we are not being overly optimistic to expect direct gain in two ways.

1. Improving our ability to drill extra-deep wells.

2. Improving our ability to drill offshore areas.

Even the practice holes have taught the oil industry things it had not known before. These are things that loom important for coming times:

1. The "outboard-motor" method is effective for holding a floating drill ship in position.

2. Long, unspotted strings of drill pipe can be rotated and drill routinely in deep, deep water.

When Mohole itself is spudded, there is excellent chance to gain these things:

1. Development and testing of drill pipe and casing for holes 30,000 ft. and deeper.

2. Improvement in equipment and methods for completing and producing wells on the ocean floor.

3. Better standards for design of floating drill ships.

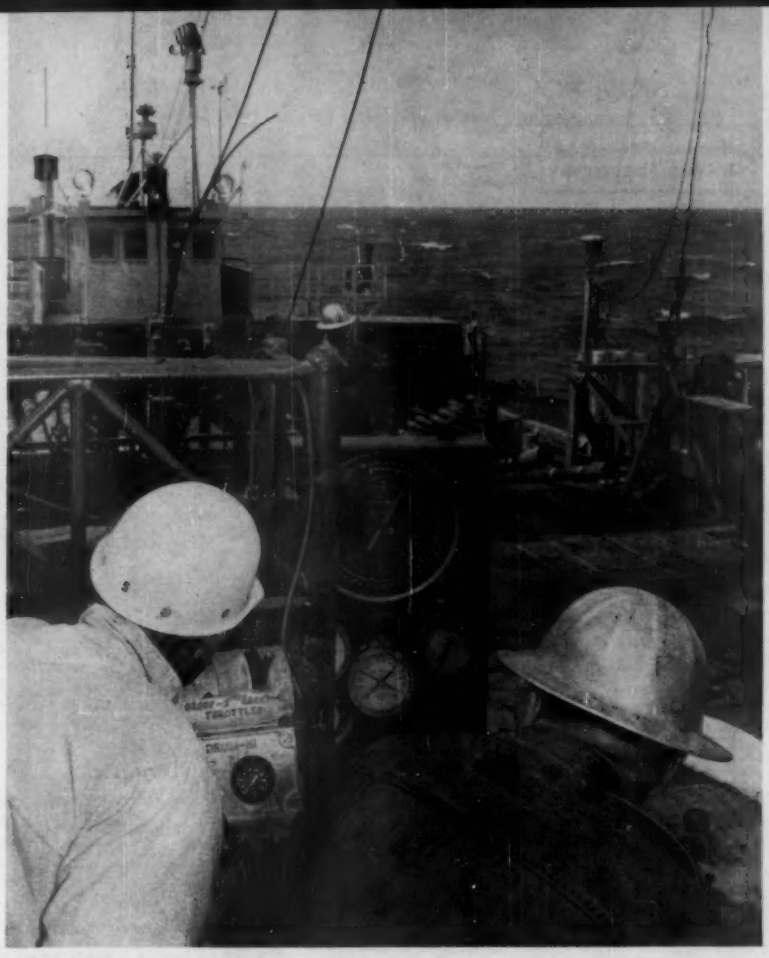
And there is more than a remote chance that the oil industry will profit in these ways:

1. New ideas to speed round trips with the drill pipe.

2. New drilling methods to drill farther and faster without pulling the drill pipe.

3. Better geological and geophysical techniques for locating oil.

Returns from investment. There's no denying how much the oil industry has contributed — and will contribute in the future—to the Mohole project. Preliminary drilling has been almost exclusively with oil-industry tools and oil-industry techniques. In the final drive to penetrate through the earth's crust, the oil industry will again be in the forefront.



"TAGGING BOTTOM" is ticklish moment, weight indicator swings wildly as a result of vessel movement in heavy seas. Under worst conditions, driller watched not only weight but also pump-pressure gage and rotary-torque indicator. Should bit strike bottom too hard, it could be damaged or drill string could be crooked.

So, oil-industry gain, though incidental to the main goal of the work, cannot be called unearned profit.

Still it is science's show, not oil's. Contract for the test drilling by Global Marine Exploration Co. was signed by the National Science Foundation, an independent agency of the federal Government. Cost of that work was just over $750,000. The entire program is under direction of the American Miscellaneous Society of the National Academy of Sciences—National Research Council. This latter group is a private organization of scientists and engineers.

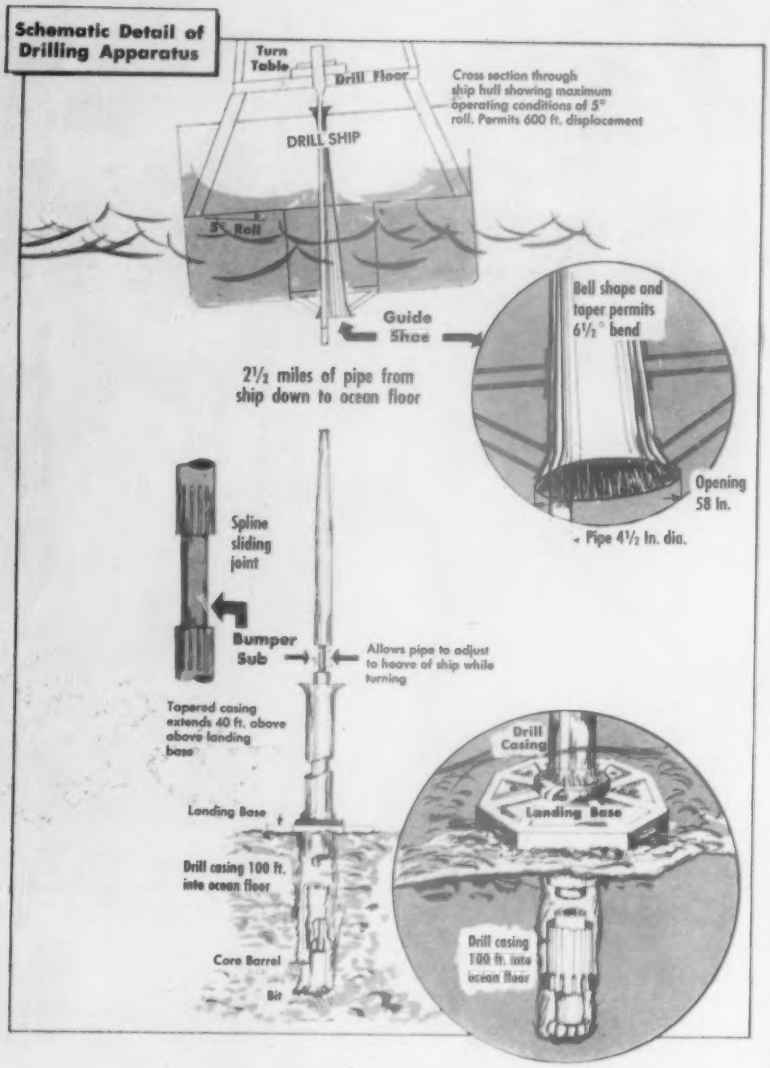
Ultimate goal is to drill completely through the earth's crust to the underlying rock known as the mantle. Contact between crust and mantle is known as the Mohorovicic Discontinuity or "Moho."

What do the scientists expect to learn? Fundamental composition of the earth itself. Samples of mantle rock will answer many old and perplexing questions.

Outboard motors. The Journal has already reported on the series of one-bit practice holes drilled in the Pacific (OGJ, March 27, April 10, and April 24, 1961). A number of the tests were drilled from CUSS I in water 11,700 ft. deep. Representing Global Marine on the operation was John Atwood, the firm's Gulf Coast manager. Drilling superintendent for the scientists was C. Don Woodward, of Texaco Inc.

Ask these men what they learned in the test work to benefit the oil industry. Both mention first the method used to keep the floating vessel on location.

It had been obvious from the outset that conventional anchors could not be used; water was entirely too deep. A new method would have to be found. Moreover, Global Marine


Schematic Detail of Drilling Apparatus
Turn Table
Drill Floor
Cross section through ship hull showing maximum operating conditions of 5° roll. Permits 600 ft. displacement
DRILL SHIP
5° Roll
Guide Shoe
Bell shape and taper permits 6½° bend
2½ miles of pipe from ship down to ocean floor
Opening 58 In.
Pipe 4½ In. dia.
Spline sliding joint
Bumper Sub
Allows pipe to adjust to heave of ship while turning
Tapered casing extends 40 ft. above above landing base
Landing Base
Drill casing 100 ft. into ocean floor
Core Barrel
Bit
Drill Casing
Landing Base
Drill casing 100 ft. into ocean floor

TO PROTECT PIPE STRING while drilling, CUSS I carried a special guide shoe that allowed no more than a few degrees of bend at the ship. Tapered casing performed same function on ocean floor. Bumper subs kept up-and-down motion of drill string from reaching the diamond-core bit.

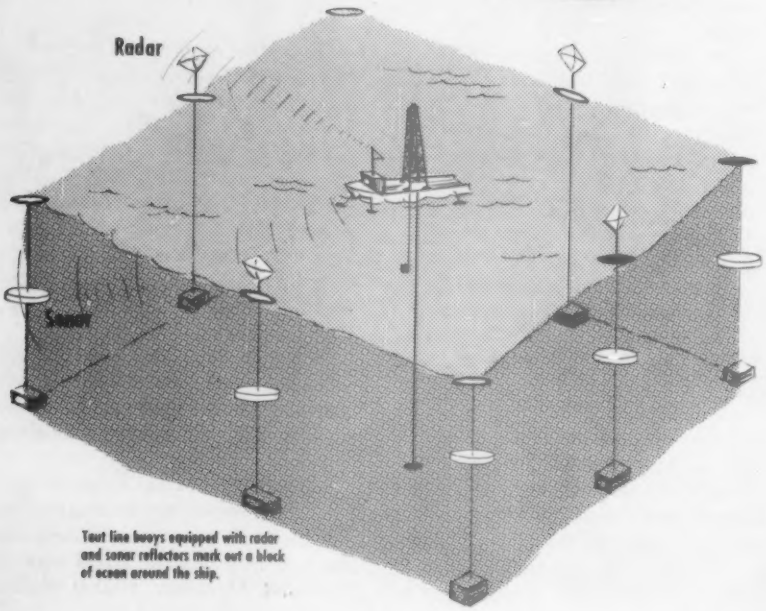
had long since learned it must keep the CUSS I, or any such floating drill ship, headed into the sea. Since wind and sea are certain to change many times during a prolonged operation, it was necessary to have a method of turning the ship about its center even while drilling.

Solution to these positioning needs was found in the Harbormaster outboard propulsion and steering unit. Four of these assemblies were mounted on the CUSS I, one fore and one aft on each side. Each unit has a 200-hp. diesel engine driving a 5-ft. propellor which can deliver a minimum of 16,000-lb. thrust. Together, the four units proved able to hold the ship within a very small radius; they could turn the ship without interrupting drilling.

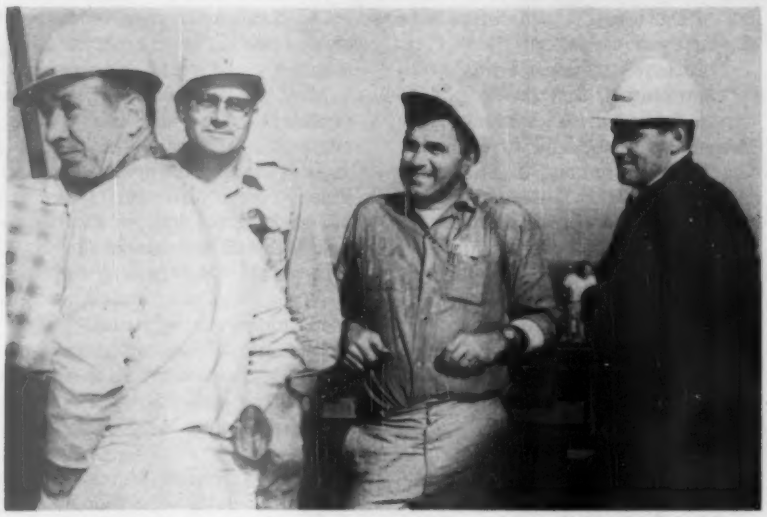
Central control. All four of the outboard units were controlled from a single, central console. Also on the console was a radar-sonar system for showing exactly where the ship was in relation to the point location where it was to be held during drilling.

The electronic equipment determined position relative to a ring of buoys anchored to the bottom. These buoys did not come to the surface, but were held several hundred feet below the surface by taut lines. In each buoy was a sonar transponder or "pinger." A sound wave sent out by the ship control brought a response from the pinger. This response was translated by electronic equipment into terms of distance.

From this distance-from-buoy, the sonar gear showed ship position. Then, the ship's pilot could regulate the amount and direction of thrust from steering units to keep the ship in correct position. In fact,



RADAR SONAR BUOYS guide unanchored ship in keeping position. Signals sent out by ship are echoed by the buoys; echoes tell distance from ship to each buoy. From this information, ship's pilot adjusted thrust and direction of outboard motors to keep vessel very close to exact point location even in heavy seas.



OIL INDUSTRY CONTRIBUTION to Mohole is symbolized by affiliation of men overseeing operation. Here, during Guadalupe tests, (left to right) are Don Woodward, Texaco Inc.; Jim Dean, Socony Mobil Oil Co.; John Atwood and Hal Stratton, Global Marine Exploration Co. Global Marine owns and operates the drilling vessel, CUSS I.

the controls were arranged so that the pilot could steer the ship with a single "joy stick" as if maneuvering an airplane. AMSOC scientists say that more elaborate electronics could make this ship positioning fully automatic.

During the recent practice runs, the ship never got more than 350 ft. off exact location. Most felt it could have been held within 50 ft. if necessary.

It doesn't seem likely that drill ships seeking oil will ever venture into water too deep for anchors to be useful. As a result, such ships should never be required to depend fully on outboard steering units. But the outboards would be of real value on drill ships.

Atwood says that his company is considering the possibility of using Harbormaster units on the ship that Global Marine is planning for operation in the Gulf Coast.

The outboard steering motors would make it possible to move the vessel quickly in response to changes in tides, winds, waves, or currents. The same motors could be used to propel the vessel in moves from one well location to another; there would be no need to call in outside tug boats.

Drill String

From the drilling standpoint, one of the thorniest problems in planning project Mohole was the drill string. Even in the practice holes, nearly 12,000 ft. of the drill pipe would be suspended in the sea, laterally unsupported. There would be no casing nor hole walls to confine the pipe.

Moreover, there would be the rolling and pitching of the ship which could kink or fatigue the pipe at the rotary table. Movement of the pipe resulting from motion of the ship or from currents in the water could cause the pipe to bend and fail where it entered the hole on the bottom of the sea.

It was also possible that the pipe would tend to whip from side to side in its long unsupported span. It might "yo-yo," or vibrate up and down its own length. Sea currents might bow the string in its midsection.

Rather than go to the drill site in ignorance of the likelihood of such catastrophies, the AMSOC committee made, with oil-industry help, theoretical checks. Oil-industry help was in the person of Arthur Lubinski, of Pan American Petroleum Corp. From the joint theoretical investigations evolved the guide shoe used on the ship and the flexible casing used on the ocean bottom.

The guide shoe was 35 ft. long and tapered from a 10-in. diameter at the top (right under the rotary table) to a 58-in. diameter at the bottom (in the water underneath the ship). This ship-mounted guide supported the drill pipe during drilling. Thus confined, the pipe could not kink nor bend sharply enough to cause rapid fatigue failure.

In practice, the guide shoe did its task well; there was no evidence of pipe fatigue even when the seas were quite heavy. Later inspection (regular oil-field inspection service) showed no unusual defects in the pipe.

The tapered casing was intended to do the same thing at the ocean bottom that the guide shoe did on the surface: support the pipe and keep it from bending too sharply. The term "tapered" results from the fact that the joint of casing (40-ft. long) had been machined so that the wells were thinnest at the top and gradually thickened toward the bottom. The joint extended above the "wellhead" on the ocean floor and the drill string rotated inside.

Vibration avoided. Even in conventional rotary drilling, the drill string tends to whip from side to side when rotated. These transverse vibrations ordinarily are harmless because the string is restricted by the walls on the hole. In studying the Mohole problem, Lubinski concluded that sea water would make an effective dampener for transverse vibration; no harm should come if rotary speed were kept below 40 r.p.m.

The preliminary work off Guadlupe Island duplicated conditions of the drill string that will exist on the Mohole itself. And, indeed, there was no trouble with pipe whip. Rotary speed was almost always held below 40 r.p.m. Even when it was taken up to 50 r.p.m. briefly, there was no evidence of trouble.

Lubinski's study showed a possibility that the "heave" cycle (up-and-down motion of the waves) might induce a resonant condition in the drill string. Were this to happen, the pipe could be parted very quickly. However, the studies indicated that chance of setting up such resonance is small and that rubber pipe protectors would help dampen resulting vibration.

As a result, the rubber protectors were used at Guadlupe Island and there was no indication that longitudinal vibration occurred.

Predrilling study was confirmed in another way. Lubinski predicted there would be no trouble from the action of subsurface ocean currents

tending to bow the drill string. Though rather strong currents were measured in the area, the pipe showed no apparent ill effects.

Final string. For the practice holes in 11,700 ft. of water, AMSOC engineers chose a drill string of 4½-in. internal-flush pipe. Bottom 8,000 ft. of the string was 13.75-lb. Grade E. Middle 3,500 ft. was 16.60-lb. P-95 pipe. And the top was made up of 20-lb. P-105 joints. Just above the drill collars, the string carried two joints of 20-lb. pipe and two of 16.6-lb.

For most work, everything above the core barrel was the same. The assembly started with a diamond-core bit followed by the core barrel. Above this was a 30-ft.-long 7½-in. drill collar. Then there were two bumper subs with 60-in. stroke each. Above the bumper subs were 75 ft. of 7½-in. collars and then another two bumper subs. Above this were nine more 7½-in. collars.

As you can see, there was a total of 20 ft. of bumper-sub stroke in the string to keep drill-string bounce from reaching the bit.

CUSS I handled the pipe in the same fashion it uses drilling for oil off California. The pipe is laid down in doubles, not stood in the derrick. Racking is automatic. About the only innovation was a set of dual elevators for raising and lowering the pipe.

Finding bottom. In the practice Moholes, it was a rather ticklish problem to determine when the drill string being lowered through the ocean finally made contact with the bottom. What made "tagging bottom" critical was the possibility that a bit striking too hard could be damaged. Or, perhaps, the drill string could be badly crooked. Danger was particularly high if the ocean floor were hard.

Because of the movement of the ship, hook weight fluctuated continually, and fluctuations were large. Sometimes when seas were high, hook load would swing rapidly from 190,000 to 250,000 lb. just before tagging bottom.

A second big problem was maintaining a constant weight on bit in spite of the motion of the ship. The weight indicator swung almost as widely while drilling, with the working of the four 60-in. bumper subs adding to the variation.

Fortunately, the water was usually calm enough that the weight indicator alone could show when bottom was touched. When the water was extremely rough, drillers watched not only hook weight but also pump pressure and rotary torque (if the table were turning). As the bit struck bottom, there would be a small increase in pump pressure (perhaps 25 to 50 psi.), and a similarly small increase in rotary torque.

Once on bottom, the driller tried to keep 4,000 to 6,000 lb. on the bit until the collars were "buried." This meant that the weight indicator had to be watched quite closely. As the bumper subs began to close, the peaks of the fluctuating weight-indicator needle dropped off.

It is not surprising, then, that every movement of the drill string and drilling fluid was gaged and permanently recorded. Included were hook load, mud-pump pressure, rotary speed, rotary torque, rate of penetration, and pump speed. All were continuously charted by two Martin-Decker multichannel recorders.

One of the recorders was installed in the vessel's pilot house and was used to coordinate drilling activity with efforts to keep the vessel in position. An AMSOC engineer kept watch on the recorder to advise the pilots when in the drilling work, vessel position was most critical. He also marked on the recorder when there was any position trouble that would affect drilling.

Connected by phone to the rig floor, this man could also warn the drillers of the position troubles.

No reentry. About the only equipment left on the ocean floor was, on one hole, the hexagonal base which supported the tapered casing joint. This, and about 100 ft. of regular casing below, were carried by a J-slot arrangement on the drill pipe. When the pipe had made enough hole to bury the casing, the base-casing assembly was "un-J'ed" and the bit cored ahead.

There was no possiblity of pulling out of the hole and then getting back into it. No hole could be drilled farther than the life of its one bit. No circulation was returned to the surface; sea water was pumped down the pipe, spilling out of the top of the tapered casing joint.

Most cores were taken with conventional wire-line coring equipment. This method worked as easily in the ocean drilling as on land. Punch cores were also taken; first of these were with a mechanical holddown device which simply set drill-string weight on the punch. Later, a hydraulic holddown was used, and it worked better.

In the last hole, a core-type turbodrill was used. While it achieved its goal, it did not appear to be any improvement over conventional rotary casing.

Though bottom sediments were sometimes quite soft, there was no tendency for the drill string to stick. On occasion during work off La Jolla, Calif. (in 3,500 ft. of water), mud was spotted in the hole, however, to protect bottom-hole tools.

It is a tribute to everyone associated with the preliminary work that there were no serious and unforeseen problems. Even when weather became heavier than expected and CUSS I took greater roll than was allowed for, drilling continued uninterrupted.

The Big Show

In the scientists' view, chief value of the practice Moholes was to prove that Mohole itself is possible of drilling. These men are well aware they are tackling something never done before. And, they propose to take every possible precaution to insure success of the project. For that reason, they are calculating every eventuality and questioning every operation. Among the things that will be scrutinized is rotary drilling itself.

To people outside the drilling industry, excavating a well with rotary methods looks quite inefficient by usual standards. It seems wasteful to pull all that drill pipe out of the hole simply to replace a little bit. It seems illogical a rig should have 1,000 hp. on the surface when only 200 or 300 hp. is being used to remove the rock from the hole. It appears ridiculous to turn the thread of a drill string at the surface to rotate a bit 10,000 ft. below. And it's almost appalling to some that bits cannot be made to last more than a few hours.

Of course, anyone long acquainted

with drilling knows why these things must be as they are. Still, no one denies that a breakthrough is possible at any time.

The scientists look at the industry from outside. They prepare to stake their professional reputations and several million dollars of public and private funds on drilling Mohole. They can hardly be blamed for putting rotary drilling under a microscope.

Most drilling men—and most of the scientists—agree that Mohole will likely be drilled in the conventional rotary manner. There just isn't any better system available now.

And, it's just barely possible that these men's fresh approach will develop something to make drilling cheaper and faster.

What particular aspects of drilling are Mohole engineers most interested in?

1. Ways to speed penetration in the extremely hard basaltic rock.
2. Ways to make bits last longer.
3. Ways to speed round trips to change bits or eliminate these trips.

Among the things the scientists will investigate to speed penetration will be such radical concepts as the flame drill, chemical drills, and the electric-arc drill. New designs for diamond, roller bits, and "bearingless" bits will be checked.

There will certainly be another look at wire-line retractable bits.

Consideration is being given automatic machinery to make round trips; some of this equipment might make a trip in one-third or one-fourth the time today's methods require. Turbodrills will not be overlooked.

No one seems to be greatly worried about finding drill pipe and casing for a 32,000-ft. Mohole. However, should the Mohole go much deeper—as might be necessary—tubular goods could be a major problem.

Real bottleneck. Even while the scientists appraise rotary drilling, they reserve greatest concern for another problem: how to get back into the hole on the bottom of the ocean floor once you get out of it. It's a "reentry" problem as complex as that faced by guided-missilemen. It isn't enough to develop a guide system to steer the bit back to bottom. The system must allow the drilling vessel to quit drilling and move entirely off location for days at a time during bad weather.

The problem is similar to that faced by the oil industry in attempting to work over wells completed on the ocean floor. Of course, water depth is greater on Mohole. AMSOC engineers have a further problem in finding ways to get mud circulation back to the drilling ship. Without mud returns, it would be necessary to use only sea water as the drilling fluid and the hole would probably have to be cored to total depth.

Among the possible solutions are pipe strings containing buoy chambers and extending from ocean floor to near water surface. Buoyed up, the pipe could support its own weight and act as "casing." Surface markers could be attached to such a buoyant pipe string.

Naval architects working on Mohole find none of the oil industry's present fleet of floating drill ships suited to long-term, ultradeep operation. As these men make their own investigations, they are certain to shed light on designs which would adapt to oil well-drilling use.

BY LAND OR BY SEA

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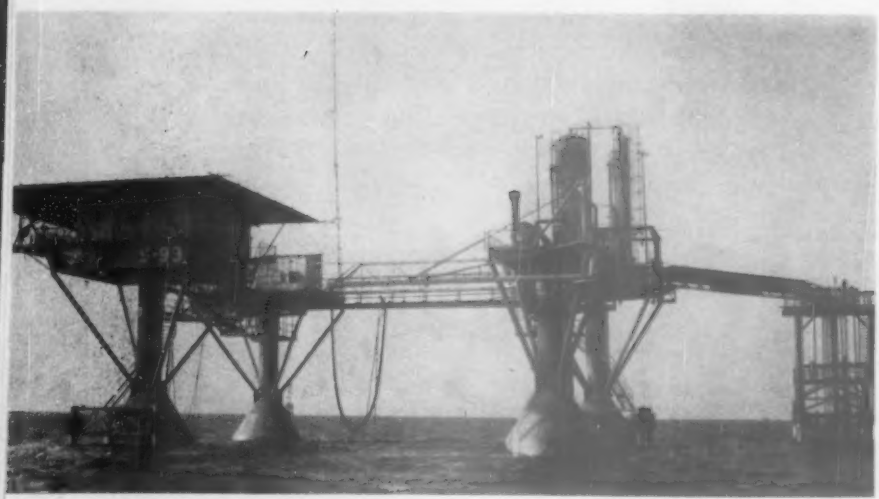
OIL-STORAGE UNIT was completely assembled in Bethlehem Steel Co.'s Beaumont yard before being towed to location. Designed for use in 35 ft. of water, the unit has a capacity of 20,000 bbl. Most of the storage space is in the lower hull, or mat, and the rest in the four columns. Fig. 1.

Underwater storage unit cuts offshore operating costs

• The California Co. has started operations with its new 20,000-bbl. submersible storage facility. Big advantage is the salvability of the unit. It can be moved to a new location without much loss in time for rigging up.

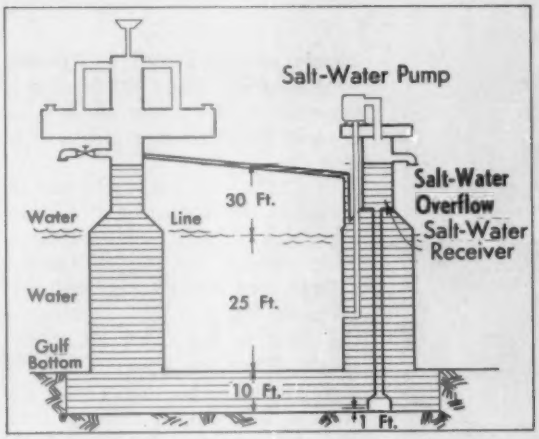


ON LOCATION, the unit rests on floor of gulf in Eugene Island area. Structure was designed to withstand 125-m.p.h. winds, and a 26-ft. wave acting on all four columns simultaneously. Fig. 2.

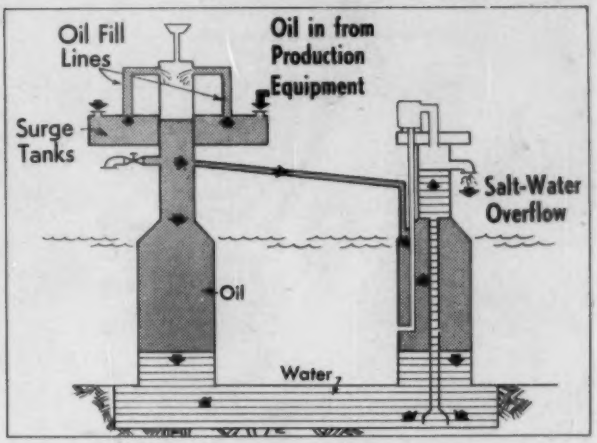
QUESTIONABLE life expectancy of an offshore oil field was the driving force behind the development of the California Co.'s 20,000-bbl. underwater storage unit.

Conventional tanks on a conventional platform take time to move, and if a field is short lived this move may mean the difference between profit and loss.

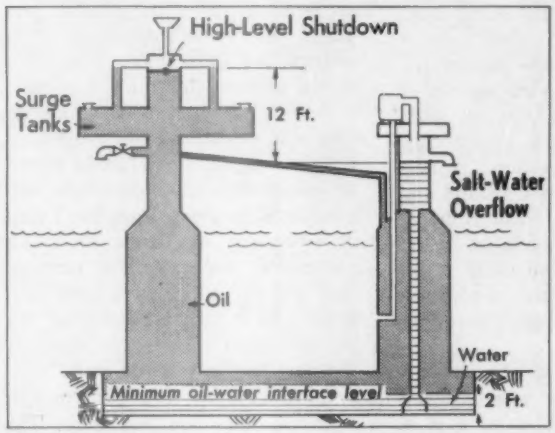
Installation and operation of the facility were described by J. C. Sparkman and W. E. Foster at the spring meeting of API's Division of Production Southern District, in Shreveport. The unit was towed from the Bethlehem Steel Co. shipyard, Beaumont, to its location in Block 39, Eugene Island area, Fig. 1. The site is 30 miles offshore and 55 miles southwest of Morgan City,



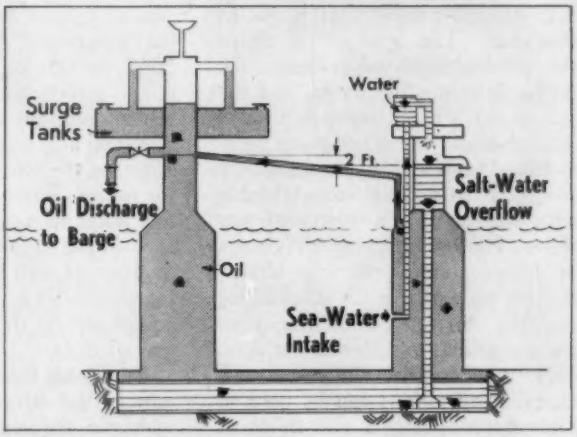
GIANT U-TUBE is the best way to describe the hydrostatic makeup of the storage facility. After sinking to the bottom, unit was filled with salt water as shown here. Pumps from an external source were used for sinking operation. Fig. 3.



INCOMING OIL from the field enters surge tanks and then goes through oil fill lines at top of column on left. Hydrostatic head is sufficient to displace water through overflow pipe on right. Fig. 4.



OIL-FILLED UNIT still contains 2 ft. of salt water on bottom of mat. This design feature was included to prevent tank bottoms from mixing with oil. Interconnecting piping keeps oil-water interface at same level in all columns. Fig. 5.



OIL DISCHARGE is accomplished by opening discharge valve on left column and starting salt-water pump on right column. Head of oil above discharge valve is great enough to cause oil to flow into barge, and incoming salt water replaces all oil withdrawn. Fig. 6.

La. Water depth at this location is 25 ft., Fig. 2.

Foundation. Unit was designed for installation in 35 ft. of water, so a 10-ft.-deep hole was excavated for placement. This excavation was made as a safety precaution, because the unit was designed to rest directly on bottom. With an additional 10 ft. of the structure submerged, the unit would be more stable, and there would be no problem with scouring of the bottom.

How it works. Sequence of operations is shown in Figs. 3, 4, 5, and 6. On completion of the initial sinking on location, the unit was full of salt water, Fig. 3. Level of the water is controlled by the location of the water overflow, 30 ft. above normal sea level. Pumps from an external source were needed for the sinking operation, and there was no difficulty in getting the unit in place successfully.

In Fig. 4, the unit is being filled with oil. The incoming flow stream goes into the surge tanks located under one of the unit's patforms, and then enters the storage space. The level at which the oil enters the storage chambers is such that there is enough head to displace water through the water overflow pipe at a lower level.

Connection between the four storage columns is made through the lower hull, or mat. Dimensions of this section, 92 by 112 by 10 ft., are such that most of the 20,000-bbl. capacity of the unit is contained there. The remainder is located in the 18-ft.-diameter columns that rise from each corner.

The columns are interconnected as shown so that the oil level is kept the same in all columns.

When the unit is full of oil, Fig. 5, there is still 2 ft. of water in the bottom of the mat. This minimum elevation of the oil-water contact has been built into the system for two reasons: (1) to avoid the possibility of introducing oil into the salt-water leg of the system, thus destroying the hydrostatic balance, and (2) to avoid contamination of the oil-water interface with any tank bottoms that may accumulate.

When in the full condition, the upper surface of the oil is at a maximum elevation above the level of the salt-water overflow. This high elevation can be used to operate a standard high-level shutdown, and provides the fluid head needed to discharge the oil.

When the loading barge is connected to the storage unit, Fig. 5,

LOADING BOOM being used here is one of two 50-footers on platform. At end of these 12-in. pipe sections is a 6-in. flexible hose that carries oil to header on barge. Fig. 7.

the oil-discharge valve is opened, and the salt-water pump is put in operation. The head of oil above the oil-discharge valve causes the oil to flow into the barge, and the salt-water pump replaces the oil with an equal volume of water.

Like U-tube. Hydrostatically, the storage unit is similar to a U-tube, with one leg always filled with salt water. The oil leg has two openings at different elevations, one for incoming oil and one for discharging oil. The difference in elevation of these openings is such that the pressure unbalance in filling and discharging operations can be used to remove either of the two fluids as required.

Platforms. Each of the four storage columns is topped with a service platform.

- Platform 1 is 30 ft. square and contains two 30-kw. generators, a 100-ft. radio antenna, and foundations for a 400-hp. gas-lift compressor and a 10-ft.-diameter precipitator.
- Platform 2 is 38 ft. square and contains a 24-ft.-square quarter building, an 8 by 24-ft. warehouse and a 60-ft.-square helicopter deck overhead.
- Platform 3 is 30 ft. square and contains three separators, two steam-heated emulsion treaters, and interconnecting production lines. A foundation for a fourth separator is included.
- Platform 4 is 18 by 25 ft., and contains the 55-hp. salt-water displacement pump, a 30-hp. fire pump, a 7-hp. circulating pump, and a steam generator.

Platforms 2 and 3 are constructed as tanks 5 ft. deep. The tank on No. 2 serves as a settling and surge tank for oil coming from the separators and treaters. It is large enough to allow almost 12 hours' settling time. One section of the storage tank has been set aside as a 180-bbl. test tank. The storage space on the No. 2 platform is used for potable water in one section and salt water in another. Salt water is used in the sanitary facilities in the quarters as well as ballast to offset the major loads of the production equipment on the diagonally opposite platform.

Additional features. The lower part of the structure was designed with the thought in mind that it would never be accessible for repair. Although the unit can be raised and moved to a shipyard if necessary, the operation would be more economical in the long run to make the structure more permanent at the outset.

Also kept in mind during the planning stage was the fact that future additions to the unit could be hazardous. For this reason the unit was built so that future expansion can be made without welding.

Loads imposed on the mat when the unit is fully loaded required the addition of stiffeners. The lower tank is divided into 64 separate compartments by perforated bulkheads, and the bottom of the mat is stiffened externally with 6-in. angle iron. Putting these stiffeners on the outside served a dual purpose. It meant that the interior of the tank bottom was smooth and unobstructed, and the stiffeners provided a better grip on the supporting soil.

The interior of the unit is completely protected with 88 "permanent" anodes. These are located in the bottom of the mat so they are covered by salt water most of the time.

A series of water jets was installed in the mat to help in cleaning out sediment accumulations. Tests showed that the oil was not a large contributor to the sediment problem, but that the sea water at the location contained about 5% solids. When the oil-water level is high enough to be undisturbed, water can be pumped through these jets and circulated out through the salt-water overflow pipe. Extreme turbidity of this water has shown that the system works.

Operation. No real trouble has occurred in about 6 months' use. There have been some bugs in the system, but these have been eliminated without difficulty.

Within 24 hours of the time the unit was positioned on bottom, oil was flowing into the tanks. Within 48 hours, all wells in the field were connected to the unit. After 5 days of operation the night shift was eliminated, and since that time the unit and the entire field have been under the supervision of one pumper-gager and two roustabouts working daylight hours only.

Oil-discharge rate has averaged about 2,000 bbl. per hour. This means that the average barge is tied up at the unit about 7 hours. During this time the position of the boom, Fig. 7, may have to be changed several times, but the length of the hose used gives enough slack for normal movement of the barge.

A lot of thought was given to the possibility that the interface between the oil and water should not be sharp and clean. Tests made in a model of the unit showed that the anticipated flow rates would not cause enough turbulence to create an emulsion at the interface, and operation in the field confirmed the results of these tests. As a safety precaution, however, sample connections, chemical injection points, collection chambers, and drawoff points were installed to handle any emulsions that might occur.

Field experience so far has shown that this type of storage is not only feasible, but comparable to conventional tanks in simplicity of operation, reliability, and maintenance.

Calnev moves batches over high places

Products line climbs more than 3,700 ft. and requires substantial back pressure to keep line full and avoid commingling of products.

THE CALNEV pipeline project consists of 235 miles of 0.250 and 0.219-wall 8-in. pipe and 13 miles of 0.219-wall 6-in. pipe with the 6-in. on the receiving end of the line. The pipeline originates at Colton, San Bernardino County, California, where refined products are received from the Southern Pacific Pipe Lines, Inc., system and transported to various terminals along the Calnev line. Two large Air Force bases are served, George Air Force base, near Victorville, Calif., and Nellis Air Force base, immediately east of Las Vegas, Nev.

Commercial terminals are near Barstow, Calif., and adjacent to the Nellis Air Force base near Las Vegas.

Union Pacific Railroad Co. and Williams Brothers Co. of Tulsa are the major stockholders in the project.

Pumping Stations

The line has two pumping stations, one at Colton, the point of origin, and an intermediate station at Baker, Calif. Each station has two seven-stage centrifugal pumps, each driven by a 350-hp., 3,600-r.p.m. electric motor. Baker station, in the middle of the California desert, is remotely operated by supervisory control from Colton. Each station can produce up to 1,700 psi. operating pressure when pumping locomotive diesel fuel, giving the line an average capacity of approximately 18,500 bbl. daily.

One unit at the Baker station is provided with a variable-speed coupling which is remotely operated by the dispatcher at Colton.

In addition to the pumping equipment at Colton, considerable operating tankage is necessary for the receipt of products tendered by various shippers from Southern Pacific Pipe Lines, Inc. The Southern Pacific line operates at a capacity of approximately 4,000 bbl. per hour, whereas the Calnev system has a capacity of approximately 775 bbl. per hour.

The working tankage at Colton station consists of one 80,000 bbl. cone-roof tank for locomotive diesel fuel, two 55,000-bbl. pontoon-type floating-roof tanks for JP-4 jet fuel, two 7,500-bbl. cone-roof tanks for truck diesel, and two 20,000-bbl. and four 10,000-bbl. double-deck type floating-roof tanks for premium and regular gasolines.

Booster pumps in the tank suction lines provide for constant suction pressure to the main discharge pumps.

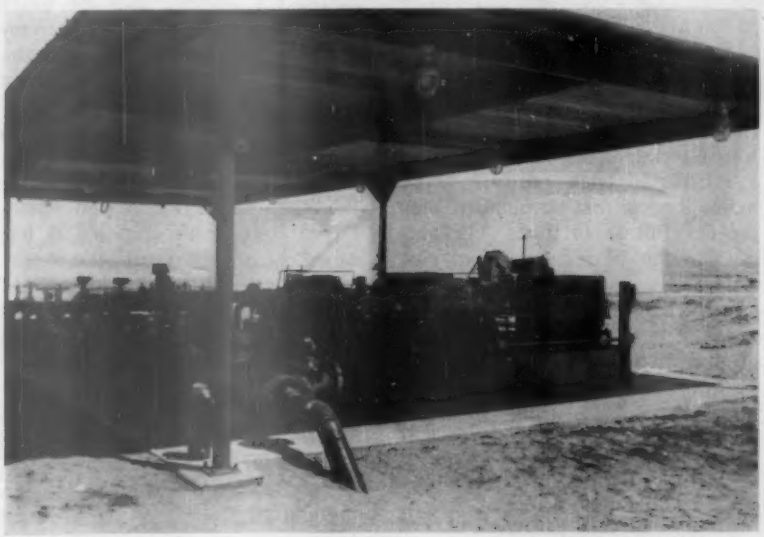
BY J. B. HARSHMAN

. . . executive vice president of Calnev Pipe Line Co. Harshman has spent his entire career in pipelines. He began with Sinclair and later served with Standard of Indiana. He has also been associated with pipeline engineering and construction firms including Fish Engineering Corp., H. C. Price Co., and Barnard & Burk Pipeline Engineering, Inc.

Terminals

The first terminal or takeoff point on the Calnev system is George Air Force base at an elevation of approximately 3,000 ft. Two 20,000-bbl. pontoon-type floating-roof tanks serve this base operating on two deliveries monthly. Products are received into the tanks from the main line through dual positive-displacement meters. Quality control for the Air Force is exercised in the pipeline tanks after which the jet fuel is transferred through another set of positive-displacement meters into the Air Force storage tankage on the base.

Barstow terminal consists of two 16,000-bbl., two 10,000-bbl., one 7,000-bbl., and one 6,000-bbl. double-deck floating-roof tanks and two 3,000-bbl. cone-roof tanks. The double-deck floating-roof tanks are for gasoline storage and the cone-roof tanks for truck diesel. Initially, three shippers are served from the Barstow terminal, but additional shippers to this area are anticipated.



COLTON PUMP STATION has two seven-stage centrifugal pumps driven by 350-hp., 3,600-r.p.m. electric motors. Jet-fuel tanks, 2 of 11 in storage area, are shown in background.

In addition to the tankage and pipeline receiving facilities, a rack is provided for loading tank trucks to serve both local and long-distance markets.

Optional delivery. The piping is so arranged that either heart cuts from batches or full-stream delivery can be made through positive-displacement meters into the shippers' tanks.

The third point of takeoff is near the center of Las Vegas, Nev., where Union Pacific has constructed tankage near its existing fueling facilities for the receipt of locomotive diesel fuel. A tank-car loading rack has also been constructed by the railroad for the movement of diesel fuel via railroad to points north and east. Full-stream receipts are taken at this location through dual positive-displacement meters.

The fourth and last delivery point is the Las Vegas terminal, 9 miles east of Las Vegas and immediately adjacent to Nellis Air Force base. This terminal includes two 40,000-bbl. pontoon-type floating-roof tanks to serve the Air Force with jet fuel. The product is checked for quality control in the 40,000-bbl. tanks after which it is transferred as needed through filters, meters, etc., to the Air Force storage tanks.

Gasoline tankage. Civilian gasoline requirements are handled through 14 double-deck floating-roof tanks having a combined capacity of approximately 145,000 bbl. Seven major oil companies are served through this terminal. Each company has two grades of gasoline and four of the shipper companies ship truck diesel in addition to gasoline and are served through four separate cone-roof tanks having a total capacity of approximately 25,000 bbl.

The identity of products must be maintained by complete segregation and proper batching methods to meet shippers' specifications when the products arrive in terminal tankage.

Receipt of products from the pipeline is through strainers, filters, and dual positive-displacement meters. A separate filling line is provided from the pipeline receiving manifold header to each tank for each shipper's product.

The truck-loading rack at the Las Vegas terminal provides an individual station for each shipper company. This consists not only of separate lines for each product from the shipper's storage tank but also a separate loading pump, meter, and loading arm for each product, thereby eliminating any possibility of contamination or commingling with the products of other shippers.

Pipe Standards

Pipe is all 8⅝-in. o.d. API Grade X42, except for the last 13 miles. Due to pumping pressures at maximum flow rates and to the terrain traversed by the line, it was necessary to use heavier wall at certain locations to avoid exceeding the code limits of fiber stress on the pipe. From Colton, which has an elevation of 1,050 ft., the line reaches an elevation of 4,425 ft. in the first 24 miles. Consequently, 0.250-wall pipe is used for the first 8.5 miles. The next 130 miles are 0.219 wall.

At mile posts 138.5 to 142.8, an elevation of 950 ft. is reached. To avoid overstressing the pipe at this location under certain operating conditions, 4.3 miles of 0.250-wall pipe is used. Three miles of 0.219-wall pipe is used leading into Baker station at mile post 145.8. There are 4.5 miles of 0.250-wall pipe on the discharge side of Baker station, then 84.8 miles of 0.219 wall to a point just south of Las Vegas, 13 miles from the Las Vegas terminal, where the 6-in. starts.

Highest Elevation

The pipeline crosses its highest elevation, 4,762 ft., at mile post 177.2, about 31.4 miles east of Baker station. The elevation at Las Vegas terminal, 2,012 ft., requires a substantial back pressure to be maintained at that terminal to keep the line full at all times. The purpose of the 13 miles of 6-in. pipe is to use up some of this head in added friction loss.

Block valves are installed aboveground in principal drainage areas. Full-opening swing check valves are installed at least every 10 miles going up mountain slopes to reduce product losses in case of line failure.

Special Design Features

In general, the Calnev project has been designed to require a minimum of operating personnel.

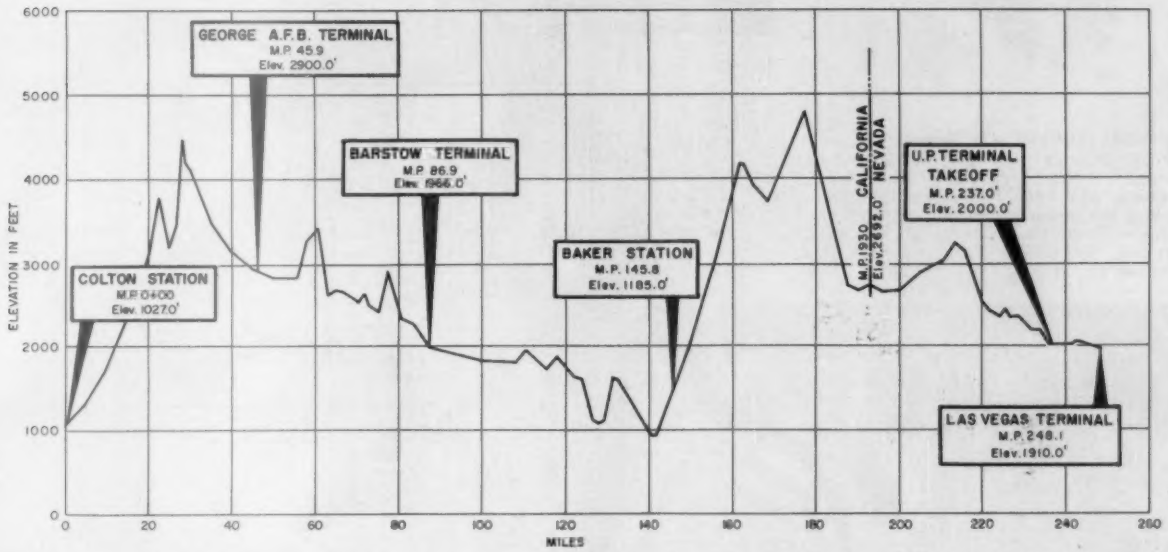
Special design features are:

1. Supervisory control.
2. Back-pressure control at terminals.
3. Interface detectors.
4. U-tube meter provers.
5. Keylock on truck-loading racks to permit driver loading.
6. Double-deck floating roofs on all gasoline tanks.

Baker station is completely automatic and is controlled from a panel board in the dispatcher's office at Colton. The pressure at Cajon Pass is transmitted to Colton and the dispatcher uses this information to regulate Baker station accordingly. This pressure regulation insures the maintenance of adequate suction pressure on either one or both units at Baker station in order to avoid a break in the fluid column as the product passes over the high point. This would result in excessive commingling of products. Variation of fluid pressure on the hydraulic coupling directly from the transmitter increases or decreases the slip in the coupling thus varying the pump speed. The motor driving the pump remains at a constant speed at all times. The pressure setting at the high point is done remotely from the dispatcher's office in Colton.

Other controls. Other supervisory control facilities include the telemetering of meter readings at George Air Force base to the dispatcher's room at Colton. Only one man is required for opening into the tanks for each delivery. Then the delivery is completed from Colton and the deliveryman at George is notified when to close out of the tanks. Deliveries of diesel fuel into Union Pacific's tanks at Las Vegas are similarly handled. After opening into the tanks, meter readings are telemetered back to the Las Vegas terminal, a 10-mile pipeline distance. Hourly receipts are taken and reported from this latter location.

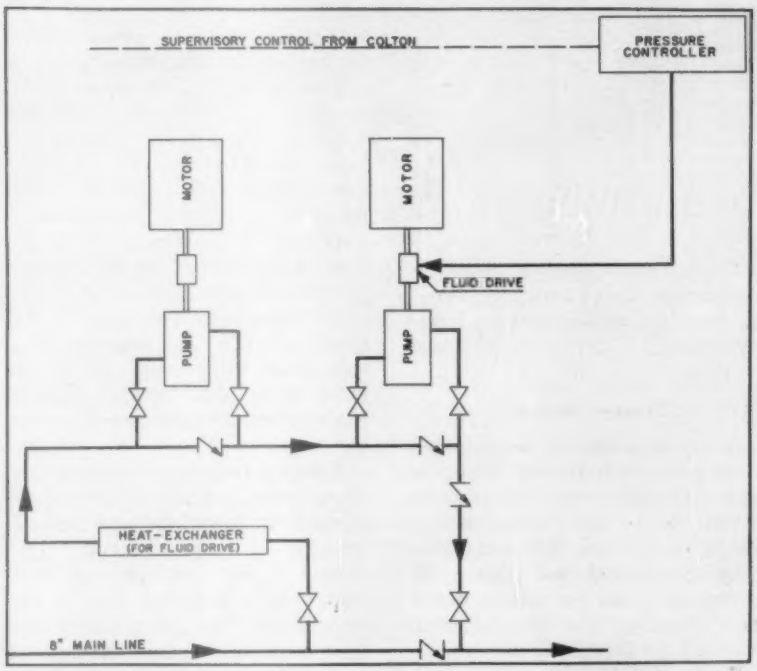
The back-pressure regulating valves at George Air Force base and Barstow terminal are controlled locally. The back pressure at Union Pacific takeoff in Las Vegas and Las Vegas terminal is controlled remotely from the terminals by regulating the pressure transmitter at the high point on the mountain pass which is approximately 71 miles west of the terminus of the pipeline.



PROFILE OF CALNEV PIPELINE. System rises from 1,050 ft. at Colton to 4,425 ft. at first peak and 4,762 ft. at second. Smaller line nearing terminus uses up some of head.

Batch detection. Because of the large number of small shippers resulting in small batches, the accurate detection of interface between batches becomes highly important. Capacitance-type interface detectors are located approximately 3 miles ahead of each receiving point from which a signal is sent to the terminal to warn of the approach of the new, incoming batch. A similar interface detector is located at the terminal where the actual arriving interface is measured to determine when and where to switch the incoming batch.

U-tube sphere-type meter provers are installed at Colton, Barstow, and Las Vegas terminals. They permit accurate proving of meters while on stream. The meter factor is automatically computed.



BAKER STATION LAYOUT. This remotely controlled station is equipped with constant-speed motors with variable hydraulic couplings to regulate the speed of the pumps.

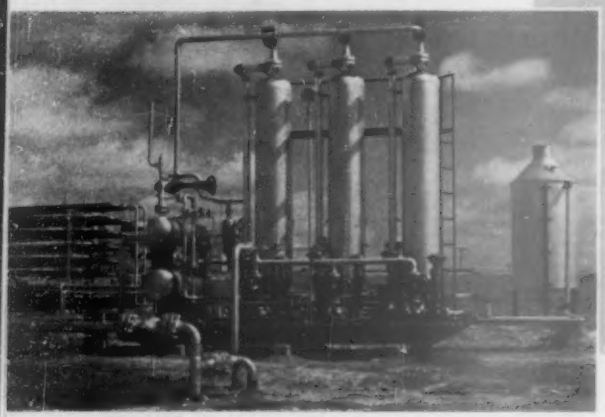
Key-lock racks. The truck racks for the loading of commercial products at Barstow and Las Vegas terminals are equipped with a bank of key locks for each shipper. These permit from one to five trucking concerns to perform their own loading operations for shippers. Each trucker is provided with the proper key and, when inserted in the appropriate lock, the meter counter is engaged. This also closes a solenoid valve on the set-stop linkage, completing a circuit which will start the loading pumps when the set-stop lever is actuated.

This eliminates the need for rackmen as the truck driver performs the entire loading operation, makes out the ticket for the load, and inserts it in the meter printer where the quantity of each product loaded is printed on the ticket. The tickets are then placed in a box on the rack and later picked up by the terminal supervisor and mailed to the offices of the respective shipper companies.

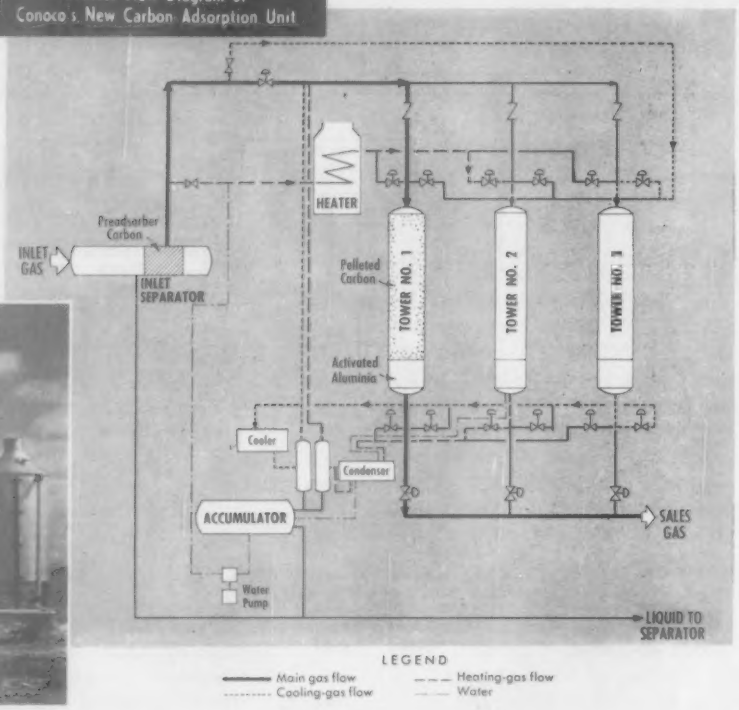
Because of extremely high summer temperatures in the area, all tanks for the storage of gasoline are equipped with double-deck floating roofs, to reduce evaporation losses.

Engineering, design, and construction of the project were handled by Williams Brothers Co., Tulsa.

PROCESS EQUIPMENT is mounted on skids for easy moving to other locations. The heater tube is a helical coil. Residue gas fuels the heater and operates the water pump and instrument system. Coolers and condensers are extended fin tubes. Flow diagram is shown at right.



Process Flow Diagram of Conoco's New Carbon Adsorption Unit



Old process performs new tricks

BY H. C. BOZEMAN
Gulf Coast Refining Editor

AN OLD PROCESS has been dug out, dusted off, and revised in light of recent developments and techniques to result in a new short-cycle fixed-bed carbon-adsorption system that efficiently strips hydrocarbons and water from natural-gas streams.

Water vapor and hot gas reactivate the bed. Incoming wet gas is the source of water. An inspection after 5 months of operation showed only 8 in. of settling in the 10 ft. deep bed. The unit still performs at initial efficiency.

The adsorbent, pelleted activated carbon, is made from petroleum coke. Activated aluminia at the bottom of the bed serves as a desiccant. The unit is designed to recover all the C_5+ components in the inlet gas stream.

An automatic control system cycles the three towers between the processing, heating, and cooling steps.

Continental Oil Co. has operated the unit, only one of its kind, since May 1960 at its Benavides compressor station in Conoco-Driscoll field, Duval County, Texas. Design capacity is 10 M.M.c.f.d. Russell Engineering Corp., Houston, built it.

TABLE 1

Component—	Mol%
Carbon Dioxide	1.69
Methane	94.10
Ethane	3.52
Propane	.27
Isobutane	.19
N-Butane	.02
Isopentane	.04
N-pentane	Trace
Hexanes Plus	.17
	100.00

Table 1 shows typical inlet gas composition for January 1961. Stock-tank liquid recovery for January averaged 2.23 bbl. per M.c.f. of inlet gas.

Process System

Operation sequence is controlled by a time-cycle controller. When the controller switches at preset time intervals, the cooled adsorber bed is placed on process and simultaneously the heated bed begins the cooling step and the saturated bed starts heating. The programer is presently set for 12-minute cycles.

Process. Gas enters the unit through the inlet separator which contains a preadsorber section to remove any free liquids and compressor lube. Gas then flows downward through the adsorber on process.

Heating. Water is pumped into the heating-gas line during the first portion of each cycle. In this case, water is injected for 3½ minutes only. The water is vaporized in the heater and flows downward through the adsorber bed, lowering partial pressures and thereby completely displacing the adsorbed hydrocarbons. It is followed by dry hot gas to complete regeneration.

The liquids are condensed in the cooling section and removed in a trap, from which they flow to an accumulator. The stripped heating gas is returned to the incoming wet-gas stream.

Cooling. Inlet gas is used to cool the adsorber bed. It flows downward through the tower, through the outlet valve, and enters the cooler. Condensed liquids are removed in a trap, from which they flow to the accumulator. The gas returns to the inlet gas line. Separate condensers and coolers prevent unnecessary commingling of rich adsorbate and lean-gas streams.

16 lb
per forging
SAVED
This mechanical-press forging has been cut in half to show the excess metal (within diagonal lines) an upsetter forging would probably include. Our mechanical-press forging saved 16 lb... and the cost of machining it.
FORGED

thanks to ingenuity and a mechanical press

Most shops would make this forging (a cone drive gear) the *conventional* way—on an upsetter. The forging would weigh 73¾ lb.

Bethlehem, using a little ingenuity, makes it on a mechanical press. The forging weighs only 57¾ lb.

There's a 16 lb difference. 16 lb of steel our customer doesn't pay for . . . or pay to machine away.

When you make a forging on an upsetter, you're limited to punching through with a straight hole. When you make a forging on a mechanical press, you can (if you know how) forge closely to the final shape. This saves our customer a lot of metal and a lot of machining.

Why then couldn't *any* forge shop handle this job? For two reasons: (1) Not every forge shop is equipped with a mechanical press. (Bethlehem has 6.) (2) Not every forge shop is staffed with craftsmen who can make a mechanical press do tricks. (Our shop is; our men can.) Try us. You'll like the savings.

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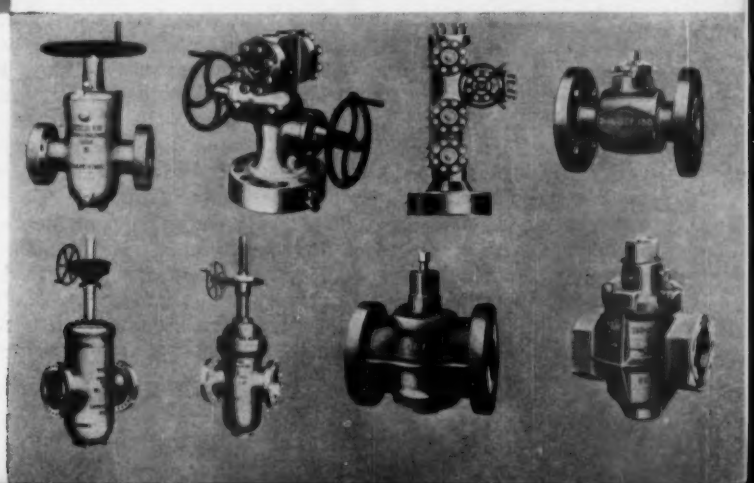
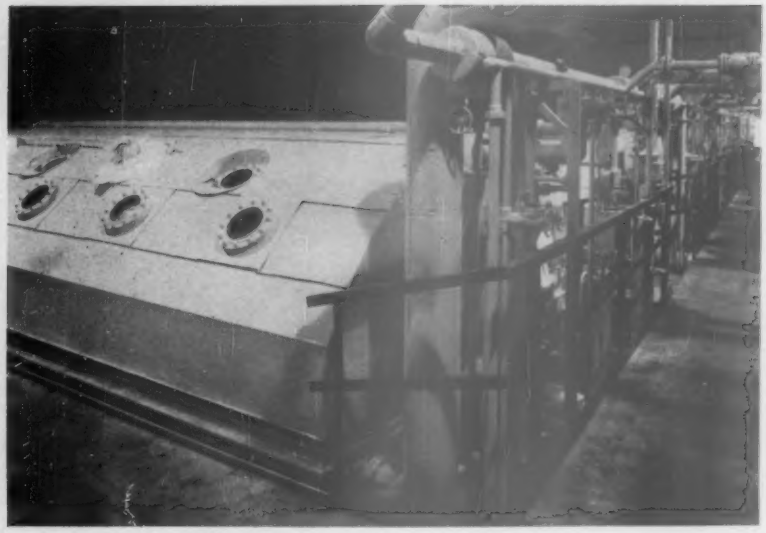


Processing notes



TWELVE LARGE ROTARY FILTERS separate the wax crystals from the oil at DX Sunray's new solvent dewaxing unit. A solvent of methylethyl ketone and toluene is used to separate the wax from the oil. The filters are the largest designed for dewaxing operations.

New wax plant is a slick performer

THE BUGS have been ironed out of DX Sunray Oil Co.'s new MEK dewaxing and deoiling unit at Tulsa and the plant is meeting expectations in every way.

The new unit, which came on stream late last year, makes Sunray the world's third-largest producer of petroleum waxes. The $7,000,000 plant processes, in blocked-out operation, 10 different charge stocks and produces about 5 800 bbl. per day of lube oil and 137 tons per day of paraffin and microcrystalline wax.

Foster Wheeler Corp. designed, engineered, and built the unit, while the process was licensed by Texaco Development Corp.

Several outstanding design features were built into the new plant which make it flexible and simple to operate, and at the same time keep the operating cost low.

Among these features are included:

... **A gas turbine** which generates all process steam and power requirements. The 7,500-hp. turbine drives a 2,000-ton refrigeration compressor and a vacuum compressor which circulates inert gas. Both of these compressors are coupled, without gear reduction, on the same shaft. This use of a single integrated machine for all power requirements meant a big savings both in investment and operating cost.

Turbine exhaust is sent through a waste-heat-recovery boiler which generates 32,000 lb. per hour of high-pressure steam. This steam supplies the entire requirement of pumps, air-compressors, and heaters. Exhaust steam from the pumps is used as process steam for the product strippers.

Natural-gas requirement for the turbine is 100,000,000 B.t.u. per hour at maximum load. With the addition of the waste-heat boiler, thermal efficiency is 57%.

Most of the turbine power is used to drive the three-stage propane compressor which generates the refrigeration needs of the three chilling sections of the plant.

A second compressor circulates flue gas to blanket the rotary filters and solvent tanks. It circulates 19,000 c.f.m. of inert gas at an absolute pressure of 3 psi.

... **Compact, efficient layout** is a second feature. The plant occupies a site of 230 by 310 ft., with a centrally located control room which is within a few seconds of any portion of the plant.

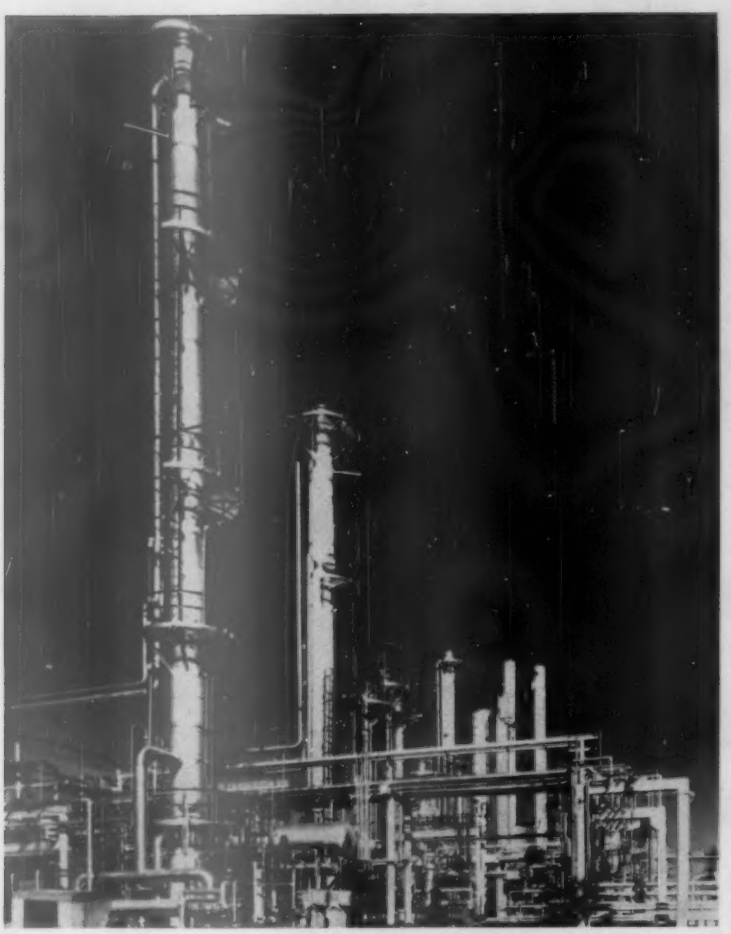
The filter building is compact and economical with filters and filtrate receivers supported at grade. Deep-well, low-NPSH vertical multistage centrifugal pumps are used to charge the filtrate to the solvent-recovery system.

There are 12 rotary filters, each having 700 sq. ft. of filtering area. Each filter handles about 4,000 bbl. per day of oil and solvent, plus 30 to 45 tons of wax. Eight are used to separate the dewaxed oil from the slack wax. Two are used to further separate the slack wax into soft and hard wax. The last two produce the final deoiled product wax.

... **Wax chillers** are automatically lubricated by a one-shot-type grease delivery to all bearings. The lubrication intervals are set into a clock. If any one of the over 1,000 lubrication points is missed, the failure is automatically signaled to the operator. In addition, continuous lubrication of all chain drives is provided.

Processing is typical of that in other MEK units. The wax distillate is diluted with solvent and passed through chillers where it is cooled to the proper pour point. The mixture is then passed through rotary filters where the wax cake is deposited on the rotary drum. The remainder of the process consists in recovering the solvent and deoiling the filtered wax to specification.

The new unit is one of a number of changes which are coming rapidly to Sunray's Tulsa works. Late additions to the refinery have included a Udex benzene-extraction unit, plus a revamp of the propane deasphalting unit in which rotating-disk contactors were installed. An 800-bbl. hydrodealkylation unit and an 85,000-bbl. crude-unit replacement are due on stream later this year.



ALKAR UNIT produces ethylbenzene by catalytic alkylation of benzene with ethylene. Ethylbenzene is then dehydrogenated to styrene.

New units triple Cosden's styrene-production capacity

TWO NEW UNITS which triple Cosden Petroleum Corp.'s styrene capacity are now on stream at the company's Big Spring, Tex., refinery. The design, engineering, and construction of the entire project, which includes additional facilities for styrene monomer production and the world's first Alkar unit, was handled by Badger Manufacturing Co., Cambridge, Mass.

The new styrene facilities, located directly adjacent to the original styrene unit which was put on stream in 1957, are designed to increase Cosden's capacity from 20 million to more than 60 million pounds annually.

The additional ethylbenzene required for the styrene unit is furnished by the Alkar unit, Universal Oil Products Co.'s process for ethylbenzene manufacture through catalytic alkylation of benzene with ethylene. Since all ethylbenzene available at the refinery was being recovered and converted to styrene, this new plant was required as an additional source for the product.

Cosden is one of eight domestic producers of styrene monomer and has set a new standard of purity with its product. All of Cosden's increased production has been committed in long-term sales contracts, or to its own requirements.

American oil will build new crude unit

A 70,000-BBL. per day crude-oil distillation unit will be built at the American Oil Co., Sugar Creek, Mo., refinery. A cooling tower also will be constructed to serve the unit.

Modification of the existing crude and coking unit and rearrangement of lines and tankage for the new crude unit are other changes that will be made as part of the refinery's modernization program. Construction is scheduled for completion by July 1, 1962.

The new unit will be constructed on a 300 by 250-ft. site in the lower refinery near the Missouri River. It will replace four existing crude-distillation units, three of which are from 30 to 47 years old. The old units will be dismantled.

The new unit will be capable of processing a wide range of Mid-Continent crude, and Wyoming crude for asphalt processing. Products will be gas, gasoline components, fuel oils, jet fuel, asphalt-base stocks, and a gas oil suitable for catalytic cracking for additional gasoline production.

A nearly 50% increase in asphalt manufacture from current capacity of 970,000 bbl. of asphalt per year will result.

Process and basic engineering designs are being handled by American Oil's research and general engineering staffs at Whiting, Ind. Ralph M. Parsons Co., Los Angeles, was awarded the contract for engineering and construction. Detailed engineering for work on the existing coking unit, lines and tankage, is being handled by the Sugar Creek refinery engineering department.

New hydrogen unit

World's largest high-pressure catalytic steam reforming furnaces will supply hydrogen to Tidewater Oil Co.'s new Isocracking unit now under construction at Avon, Calif. The new furnaces will convert refinery and natural-gas feed to more than 50 million cubic feet per day of hydrogen for the 20,000-bbl. hydrocracking unit. Selas Corp. will supply the furnaces. Hydrogen will be produced by reacting the gas with steam, over a catalyst, at 1,450° F. and 175 psi.

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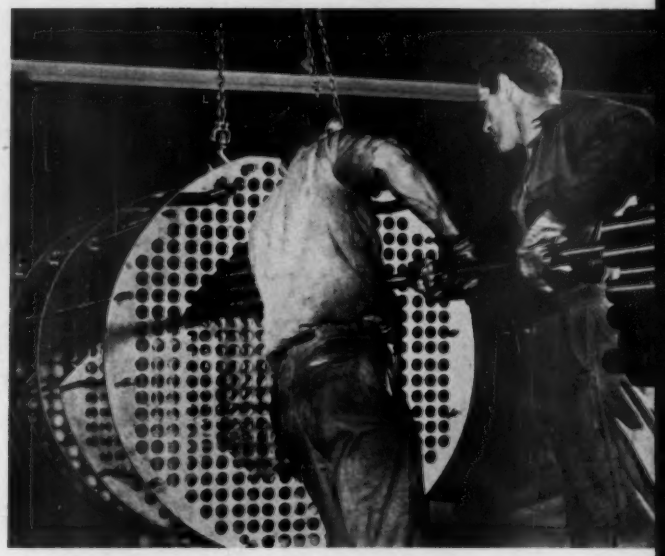

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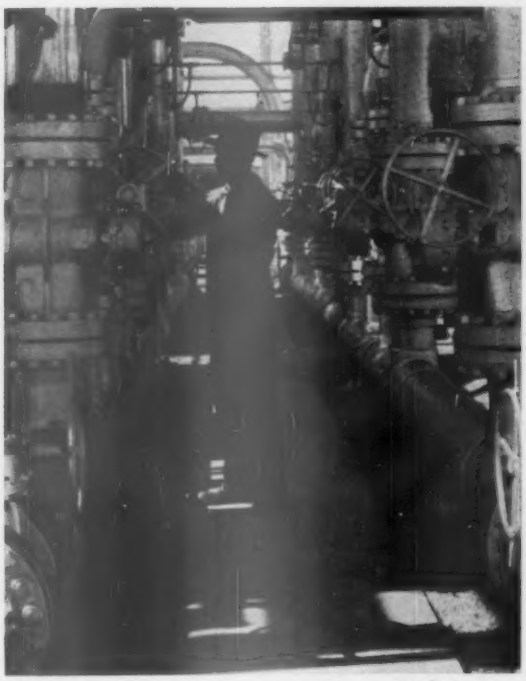

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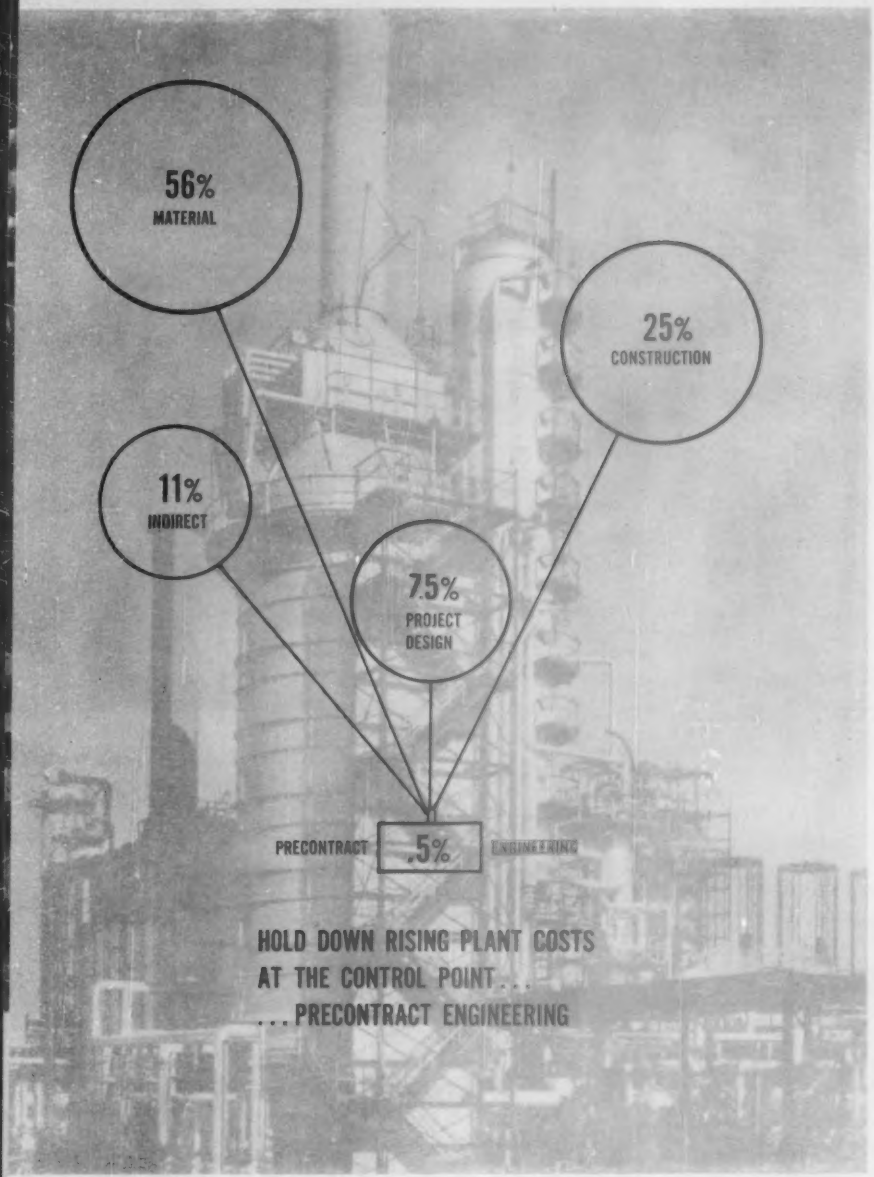


How to evaluate

PRECONTRACT ENGINEERING

Experience shows the designs and budgets produced in this early engineering frequently are a guide for the entire project, making precontract engineering one of the most important engineering phases of the construction.

PRECONTRACT ENGINEERING for a refinery-construction job involves less than 0.5% of the total cost of the project, but often serves as a guide for spending the remaining 99.5% of the cost.

The process-plant precontract specification frequently is referred to as a contract document. Since this is the case, a better understanding of the significance of precontract engineering will help the client and engineer-constructor plan mutually satisfying projects.

Prepared by a team of experienced professionals, the proposal will cost less than 5% of the project engineering man-hours, equivalent to considerably less than one-half of 1% of the total project cost. Proposal engineering man-hours are usually reflected in a direct reduction in project engineering man-hours. Add to this the savings due to elimination of frequent contract changes and revised layout, and the proposal engineering assumes primary importance.

Significant savings result when design changes are made before project expenditures rise. Delays in a project are more costly when designs and materials are changed during a rising "cash flow" curve at a critical stage of a project scheduling.

Let's examine the team organization and functions for a repre-

By JOHN J. SCHOTTINGER

. . . engineer for Lummus Co. Schottinger is a graduate of Rutgers University. He began his career in the petroleum industry in 1946 when he joined Tidewater Oil Co. as a construction engineer at the old Bayonne, N. J. refinery. He worked for Tidewater 4 years, then spent 6 years with Foster-Wheeler Corp. before joining Ralph M. Parsons Co. 4 years ago. He recently become associated with Lummus. Schottinger is a registered professional engineer in New York, New Jersey, and California.

sentative project in the proposal stage. Experience shows engineering may represent approximately 7.5% of the plant cost, purchased materials 56%, field costs (labor, equipment, supervision) around 25%, and 11% for indirects, home-office costs, contingency, and profits. The remaining 0.5% is covered by the precontract engineering.

Developing a Contract

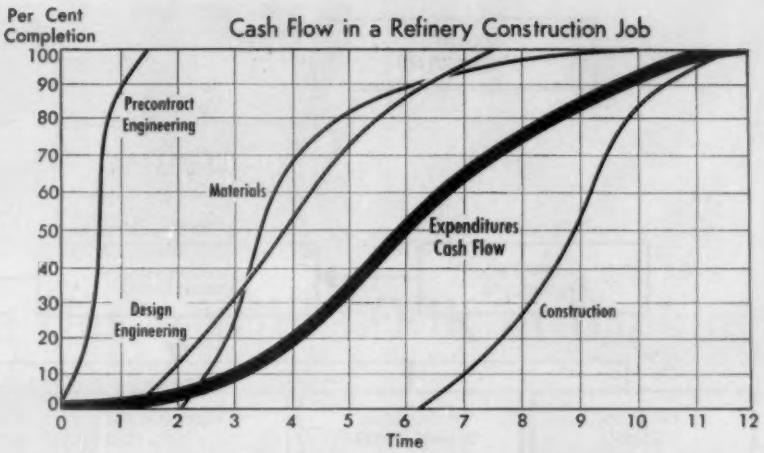
A client inquiry will be received by business development and reviewed by management. When management has determined if this inquiry will be processed, the team is assigned and goes to work. Each inquiry receives a careful design review by a staff of experts in each phase of the project. Alternate methods are evaluated and design criteria are developed, based on proven experience in similar projects.

Because of time requirements, engineering will first prepare major equipment specifications for vendor quotations. Pressure vessels, pumps, exchangers, and heaters will be designed and specified. Vendors will require 2 to 3 weeks to prepare quotations.

The plant layout and piping and instrument diagram receive attention next. These are the two most important drawings for any plant design. The plant layout drawing provides the client with an over-all picture of the contractor's conception of the design. The efficiency of arrangement can be the most important factor affecting economy of design.

The accuracy of the estimate and completeness of design will be reflected in the care with which piping and instrument diagram are prepared. The piping account alone represents the largest single cost of material, excepting major equipment, and is the single largest field labor account in most refinery process plants.

The engineering data are transmitted to purchasing for pricing equipment, to estimating for pricing other materials. Engineering develops design criteria for all phases of the project. These include electrical design, usually a single diagram giving all major sizes of switchgear and motors, and specifications for foundations, structural steel, underground piping, and all other material categories.



DESIGN CHANGES are much more economical in the precontract stage, before large project expenditures are scheduled.

Because of the limited time schedule to cover every phase of a project in the estimate stage, communication between departments must be informal and complete. Emphasis must be placed on each item of cost. However, time will be apportioned in order of relative importance of cost accounts. Each member of the team will realize the approximate value of each material category of the design and estimate.

Important Contract Costs

A representative distribution of cost items might be as follows:

	Material as Percentage of Total Plant Cost	Labor as Percentage of Total Plant Cost
Major equipment	35	3
Piping	12	6
Electrical	2	1
Instrument	3	2
Structural steel	2	1
Foundations	2	2
	56	15

The remaining percentages for total plant cost would be covered by field, engineering, and other costs covered earlier.

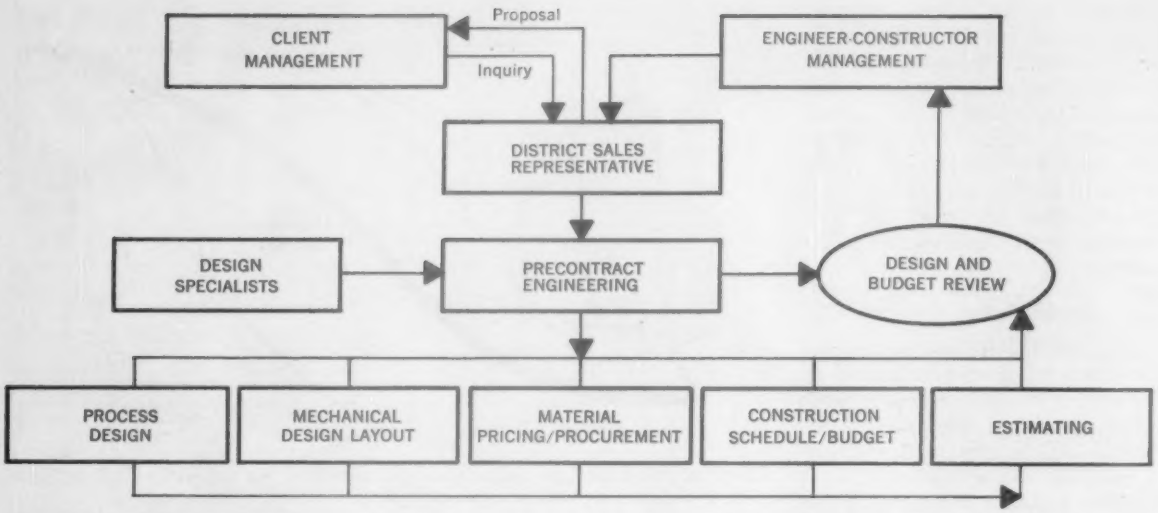
The purchasing department realizes that material prices are seldom static, but moving up or down in relation to future time. By careful canvassing of vendors for each particular project, the material for this job, in this geographic plant location and at this delivery time, is evaluated for maximum economy.

In addition to major equipment, purchasing will also maintain up-to-date prices for bulk items of material such as pipe, valves and fittings, structural steel, etc. These prices vary with economic conditions in the industry, but also reflect the size of single projects; the larger the project the lower the unit prices that can be obtained. Shop-frabricated piping will vary somewhat to reflect the backlog of work in each fabricator's shop.

In process-plant estimates where approximately 56% of plant cost can be materials, purchasing will play a most important part in accurate estimating. The construction-cost account in our contract cost analysis is one of the most difficult to accurately evaluate in respect to future time.

Labor productivity in this particular area may vary as much as 40% with respect to another section of the country. Labor availability is an important consideration, and this can vary for any area if other major projects for this region are scheduled simultaneously. This raises the question of whether the local labor supply can provide construction manpower to meet schedules.

Construction review. The construction department will review the project date, equipment delivery dates, and project schedule. Often



INFORMAL COMMUNICATION between members of a precontract engineering team are required to maintain flexibility in short-time schedules.

a site visit will be scheduled to review the topography, meet with union locals, and gather data on subcontractors and suppliers in the area. Construction will evaluate the effect of weather on the schedule. A schedule that is too fast or too slow in the field will result in increased costs. Because of these factors a labor estimate is reviewed by the construction department working closely with the estimating department.

The estimator assigned to the project builds up his code of accounts and screens all of the cost and design data received from the other members of the team. Every item received from other departments is checked for completeness and accuracy. The estimator assembles all cost information and applies his skill to the interpretation of the design in terms of costs.

Close communication among members of the group results in checks and questions affecting work between the groups. How are the heavy lifts made, gin poles or cranes? Can engineering firm up foundations so work can begin before rainy weather in the field? Will the furnace supplier subcontract erection at lower cost than we can erect? Is there a long delivery tower that may delay setting pumps and exchangers in the field? How does engineering manpower loading charts fit in the over-all manpower schedule? Will drawings be mailed for approval (2-3 weeks required) or a client resident representative assigned (2-3 days required) to approve drawings?

Every detail is questioned with regard to adequacy of design, economy of concept, within the job requirements.

Finally, the estimator brings the cost accounts to the total cost figure. Engineering assembles the proposal specifications.

Review meeting. A management review meeting is attended by representatives of each department. Engineering must justify the design concept and discuss alternate methods. Purchasing will know what proportion of equipment prices are firm, and estimate amount of escalation expected, if any. Construction will advise on expected labor conditions in the area. The estimator will know the degree of accuracy expected from this estimate. Ratio checks to other similar projects are made; deviations are discussed, reasons given. Fee and contingency are applied, and a final cost approved by management.

Every proposal differs in considerable detail, but they will be prepared by highly skilled specialists working together under demanding time schedules, and producing accurate costs and designs.

The team will have expended man-hours equivalent to less than 5% of engineering man-hours for an actual project.

Why Important

This relatively short period of engineering and estimating assume increased importance because:

1. There is every reason to expect that this design and budget will become contractually binding on the contractor.
2. Proposed designs often become final designs for projects because of time schedules; because they receive time-consuming approvals within client management and because the bid specifications are often referred to as contract documents.
3. The advantage of short completion schedules often necessitates the purchase of long delivery items based on proposal specifications.
4. Design changes incorporated in the precontract engineering stage are more economical; changes are made before project expenditures assume importance.

Less than 5% of equivalent engineering man-hours of 0.50% of the total project costs spent in the proposal stage can be the most significant cost of any project.

"Significant savings result when design changes are made before project expenditures rise. Delays are costlier when designs and materials are changed during a rising "cash flow" curve at a critical stage of scheduling."

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French petrochemical industry mushrooming

BY MAURICE MOULIN

Chemical engineer at University of Lyon and head of the department of research and development of chemical markets for Esso Standard, SAF.

THE FRENCH petrochemical industry developed much later than in the United States, but it is now rapidly expanding with annual sales exceeding 1,200 million new francs.

It was necessary for France to reconstruct refining facilities, and develop ample petroleum and natural-gas reserves before launching into petrochemical manufacturing.

These two tasks having been accomplished, it is now possible to make use of catalytic cracking, catalytic reforming, and steam cracking plants for petrochemical purposes. These plants provide the basic hydrocarbons which are used by the refiners and the chemical industry for making intermediate products such as plastics, rubber, paints and varnishes, detergents, and synthetic fibers.

Aiding petrochemical growth is the fact that for economic reasons the French coal industry, whose production appears to be stabilized around 60 million tons, is very far from being able to supply the needs of the chemical industry.

FRENCH NATURAL-GAS PRODUCTION (IN THOUSAND CUBIC METERS)

Years	1938	1952	1953	1954	1955	1956	1957	1958	1959	1960
Tonnages	nil	266,500	244,500	259,100	266,350	319,400	552,795	1,045,789	2,664,000	4,548,000

FRENCH CRUDE-PETROLEUM PRODUCTION (IN THOUSAND TONS)

Years	1938	1952	1953	1954	1955	1956	1957	1958	1959	1960
Tonnages	72	350	368	508	875	1,264	1,680	2,408	3,853	11,400

TONNAGES OF CRUDE PETROLEUM TREATED IN REFINERIES
(In thousand tons)

Years	1938	1952	1953	1954	1955	1956	1957	1958	1959	1960
Tonnages	6,978	21,493	22,647	23,838	25,086	26,802	24,965	29,788	30,760	32,890

The three preceding tables give a concrete picture of the French petroleum industry's achievements in production and refining.

The proved reserves of petroleum in the Sahara exceed 600 million tons. To this can be added the annual production of France itself: 1,300,000 tons in the Parentis region, 500,000 tons in the Paris basin, 100,000 at Lacq and 750,000 tons at Gabon. As to natural gas, the

TABLE 1—CATALYTIC CRACKING PLANTS

Name of company and location—	Capacities (bbl./day)
Compagnie Francaise de Raffinage (CFR):	
Gonfreville	17,000
La Mede	10,000
Esso Standard, SAF:	
Port Jerome	20,000
Shell-Berre:	
Petit-Couronne	10,000
Berre	10,000
Mobiloil Francaise:	
Frontignan	10,000
Antar:	
Donges	10,000
UNIP:	
AMBES	4,600
Total	91,600

Note: CFR is expected to start up a new plant of 18,000 bbl. per day at Gonfreville towards the end of 1961.

TABLE 2—CATALYTIC REFORMING PLANTS

Name of company and location—	Capacities (bbl./day)
Compagnie Francaise de Raffinage:	
La Mede	19,000
Esso Standard:	
Port Jerome	13,000
Bordeaux	7,200
Shell-Berre:	
Petit-Couronne	12,400
Mobiloil Francaise:	
ND de Gravenchon	3,800
Frontignan	3,800
ANTAR:	
Donges	10,000
Societe Francaise des Petroles BP:	
Lavera	5,000
Dunkerque	9,000
Total	83,200

Note: Shell-Berre is planning to build a 13,000-bbl. per day plant at Berre.

TABLE 3—STEAM-CRACKING PLANTS

Name of company and location—	Capacities (bbl./day)
Esso Standard, SAF:	
Porte Jerome	5,300
Naphtachimie	7,500
Total	12,800

Note: Compagnie Francaise de Raffinage plans to start up in 1963 a 7,000-bbl. per day plant.

TABLE 4—OLEFIN PRODUCTION

Existing Plants

Product and producing company:	Location	Start of prod.
Ethylene:		
Compagnie Francaise de Raffinage	Gonfreville	1959
Naphtachimie	Lavera	1953
Esso Standard SAF	Port Jerome	1959
Propylene:		
Naphtachimie	Lavera	1953
Compagnie Francaise de Raffinage	La Mede	1953
Antar PA	Donges	1953
Shell-Berre	Berre	1953
Esso Standard, SAF	Port Jerome	1955
n-Butene:		
Shell-Berre	Berre	1958
Esso Standard, SAF	Port Jerome	1959
Isobutylene:		
Compagnie Francaise de Raffinage	Gonfreville	1959
Esso Standard, SAF	Port Jerome	1959
Di-isobutylene:		
Shell-Saint-Gobain	Berre	1958
Heptene:		
Compagnie Francaise de Raffinage	Gonfreville	1958
Tripropylene:		
Esso Standard, SAF	Port Jerome	1955
Compagnie Francaise de Raffinage	Gonfreville	1958
Olefins C_9-C_{10}:		
Shell-Saint-Gobain	Berre	1959
Tetrapropylene:		
Esso Standard, SAF	Port Jerome	1955
Compagnie Francaise de Raffinage	Gonfreville	1958
Olefins C_{11}-C_{14}:		
Shell-Saint-Gobain	Berre	1959

Estimated annual production capacity (end of 1960) = 334,000 tons.

Projects

Product and producing company:	Location	Planned start of prod.
Ethylene:		
Compagnie Francaise de Raffinage	Gonfreville	1963
Naphtachimie	Lavera	1961
SNPA	Lacq	1962
Propylene:		
Naphtachimie	Lavera	1961
Compagnie Francaise de Raffinage	Gonfreville	1963

Estimated additional annual production capacity for 1963 = 179,000 tons.

TABLE 5—DI-OLEFIN PRODUCTION

Existing Plants

Product and producing company:	Location	Start of prod.
Butadiene:		
Naphtachimie	Lavera	1957
Esso Standard, SAF	Port Jerome	1959

Estimated annual production capacity (end of 1960) = 9,000 tons.

Projects

Product and producing company:	Location	Planned start of prod.
Butadiene:		
Naphtachimie	Lavera	1961
Societe des Elastomers de Synthese*	Berre	1963
Compagnie Francaise de Raffinage	Gonfreville	1963

Estimated additional annual production capacity for 1963 = 97,000 tons.

*For the production of 70,000 tons of SBR-type rubber and of 25,000 tons of BR-type rubber.

TABLE 6—AROMATIC HYDROCARBON PRODUCTION

Existing Plants

Product and producing company:	Location	Start of prod.
Benzene:		
Antar PA	Donges	1958
Toluene:		
Antar PA	Donges	1958
C_8 (xylenes and ethyl benzene):		
Antar PA	Donges	1958
Heavy aromatic solvents:		
Antar PA	Donges	1958

Estimated annual production (end of 1960) = 55,000 tons.

Projects

Product and producing company:	Location	Planned start of prod.
Benzene:		
Antar PA	Donges	1962
Toluene:		
Antar PA	Donges	1962
C_8 (xylenes): orthovylene and para xylene:		
Esso-Standard, SAF	Port Jerome	1962
Antar PA	Donges	1962-63
Heavy aromatic solvents:		
Esso-Standard, SAF	Port Jerome	1962
Antar PA	Donges	1962

Estimated additional annual production capacity for 1963 = 102,000 tons.

reserves at Hassi R'Mel are estimated at 1,600 billion cubic meters and those at Lacq at 300 billion cubic meters.

Refining facilities at the present time consist mostly of: Catalytic cracking, catalytic reforming, and steam cracking.

The first type of plant produces ethylene, propylene and the butenes; the second, aromatic hydrocarbons such as benzene, toluene, ethylbenzene and the xylenes; and the third makes it possible to obtain various di-olefins such as butadiene, isoprene, cyclo-pentadiene, etc. Tables 1 through 3 list these plants.

Investments in the French petrochemical industry actually reached 220 million new francs (NF) at the end of 1954, 240 million NF at the end of 1956, and 410 million NF at the end of 1958. Moreover the investment in new plants planned or under way for the period 1959 through 1961 will add another 1,100 million NF. Once this construction has been completed the investment will be four times greater than it was at the end of 1958.

The principal petrochemical plants have been erected near the large refinery centers in the Basse Seine district around l'Estang de Berre, and in the Lacq region. This type of location is necessary for two reasons: (1) long-distance transportation costs of refinery gases used for chemical manufacture would be excessive, and (2) byproducts of chemical manufacture can be used by the refineries.

To give a general idea of the growth of the French petrochemical

TABLE 7—PRODUCTION OF DIRECT OLEFIN DERIVATIVES

Existing Plants

Product and producing company:	Location	Start of prod.
Polyethylene BP:		
Naphtachimie	Lavera	1958
Societe Normande de Matieres Plastique	Port Jerome	1959
Manufacture Normande de Polyethylene	Gonfreville	1959
Polyethylene HP:		
Ethylene-Plastique Normandie	Port Jerome	1959
Ethylene oxide:		
Naphtachimie	Lavera	1953 and 1960
Marles-Kuhlmann	Gonfreville	1959
Propylene oxide:		
Marles-Kuhlmann	Chocques	1957
Isopropanol:		
Naphtachimie	Lavera	1953
Shell-Saint-Gobain	Berre	1953
Acetone (from cumene):		
Progil-Electrochimie	Pont-de Claix	1954
Rhone-Poulenc	Peage-de-Roussillon	1954
Secondary butanol:		
Shell-Saint-Gobain	Berre	1958
SIDA	N. D. de Gravenchon	1960
Butyl rubber:		
SOCABU	Port Jerome	1959
Oxo alcohols:		
Courrieres-Kuhlmann	Harnes	1956
Dodecyl-benzene:		
Esso-Standard, SAF	Port Jerome	1959
Petrosynthese	Gonfreville	1958
Shell-Saint-Gobain	Berre	1958
Sec. alkyl sulfate:		
Shell-Saint-Gobain	Petit-Couronne	1951
Epikote resins:		
Shell-Saint-Gobain	Berre	1957
Chlorinated solvents:*		
Pechiney	Saint-Aubian	1957
Progil	Pont-de-Claix	1958

Estimated annual production capacity (end of 1960) = 289,000 tons.

*Perchloro ethylene, carbon tetrachloride, allyl chloride, dichloro propane, etc....

Projects

Product and producing company:	Location	Planned start of prod.
Propylene oxide:		
Naphtachimie	Lavera	1961
Acetone (from cumene):		
Rhone-Poulenc	Peage-de-Roussillon	1961
Polyethylene HP:		
Ethylene-Plastique-Normandie	Lacq	1962
CFR-El Paso	Gonfreville	1963
Vinyl chloride:		
Vinylacq	Lacq	1962
Polypropylene:*		
(Not yet formed)	Not yet decided	1962
Epikote resins:		
Shell-Saint-Gobain	Berre	1961

Estimated additional annual production capacity for 1963 = 101,000 tons.

*Societe Pechiney and Societe Normande le Matieres Plastiques have come to an agreement with Societe Montecatini.

TABLE 8—PRODUCTION OF DIRECT DIOLEFIN DERIVATIVES

Existing Plants

Product and producing company:	Location	Start of prod.
Tetrahydrophthalimide:		
Naphtachimie	Lavera	1956
Nitrile rubber and Kralastic resins:		
Ugine	Villers-Saint Sepulcre	1960

Estimated annual production capacity (end of 1960) = 11,000 tons.

Projects

Product and producing company:	Location	Planned start of prod.
SBR-type rubber:		
Societe des Elastomeres de Synthese	Berre	1961
BR-type rubber:		
Societe des Elastomeres de Synthese	Berre	1963
Firestone	Lillebonne	1962
SBR Latex (dry product):		
Firestone	Lillebonne	1962

Estimated additional annual production capacity for 1963 = 120,000 tons.

TABLE 9—PRODUCTION OF DIRECT AROMATIC HYDROCARBON DERIVATIVES

Existing Plants

Product and producing company:	Location	Start of prod.
Phenol (from cumene):		
Progil-Electrochimie	Pont-de-Claix	1954
Rhone Poulenc	Peage-de-Roussillon	1954
Dimethylterephthalate:		
Rhodiaceta	Saint-Fons	1959

Estimated annual production capacity (end of 1960) = 55,000 tons.

Projects

Product and producing company:	Location	Planned start of prod.
Phenol (from cumene):		
Rhone-Poulenc	Peage-de-Roussillon	1961
Dimethylterephthalate:		
Rhodiaceta	Saint-Fons	1961
Rhone-Poulenc	Saint-Fons	1962

Estimated additional annual production capacity for 1963 = 23,000 tons.

PRODUCTION CAPACITY (TONS)

	End, 1960	End, 1963 (est.)
Carbon black	45,000	95,000
Ammonia (expressed in N_2)	380,000	435,000
Sulfur	790,000	1,283,000

industry, Tables 4 through 9 show existing and planned facilities for the manufacture of chemicals from petroleum hydrocarbons.

In addition to the foregoing tables, mention should be made of the production of carbon black from certain aromatic petroleum distillates, ammonia from thermal cracking of natural gas, and sulfur from the desulfurization of natural or refinery gases.

Towards the end of 1961 SNPA should be able to refine approximately 7 billion cubic meters of natural gas, resulting in a production of approximately 1,250,000 tons of sulfur and the distribution of more than 4½ billion cubic meters of purified gas.

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Subsurface hydraulic pumping (continued)

BY JOSEPH ZABA

HYDRAULIC PUMPING systems may be divided into three general groups: the conventional, the free-pump, and the closed system. At least two variations are available in each of these groups. Each is designed for a specific application and each has its advantages and disadvantages.

Conventional system. The first variation of this system is the one which originally introduced hydraulic subsurface pumping. The system corresponds in effect to the insert-type sucker-rod pump lowered into the tubing on rods and set in the bottom of the tubing. The subsurface hydraulic production unit is lowered into the regular tubing on a string of small tubing and is set in the bottom of the regular tubing (Fig. 58-A). The power fluid is supplied to the surface unit through the small tubing while production, mixed with the spent power oil, is returned to the surface through the annulus between the small and the regular tubing.

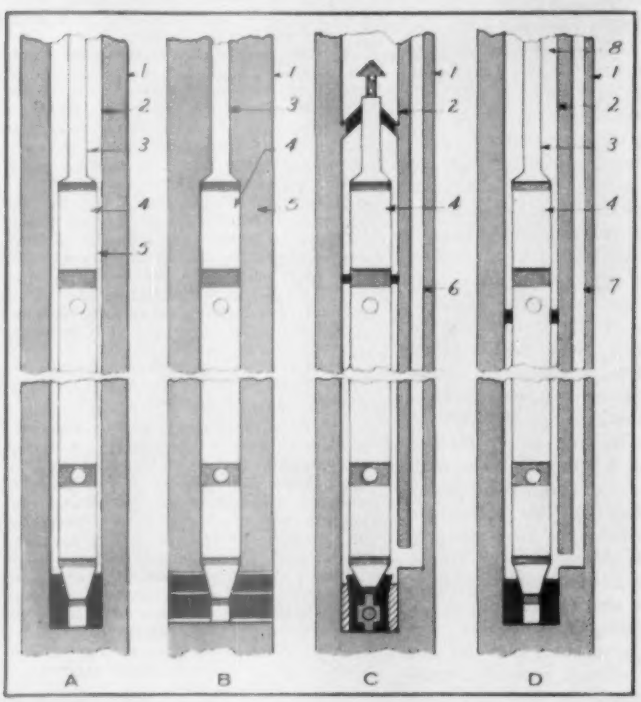
The arrangement has two advantages. Gas can be vented through the casing annulus and the system can be used in casing of relatively small diameter. The disadvantage is the fact that the small tubing has to be pulled to bring the pump to the surface for repairs.

The second variation of the system corresponds to the casing-type sucker-rod pump. The subsurface unit is lowered into the well on tubing and tubing is packed off within the casing (Fig. 58-B). The power oil is supplied to the unit through the tubing, and production, mixed with spent power oil, is lifted to the surface through the casing annulus.

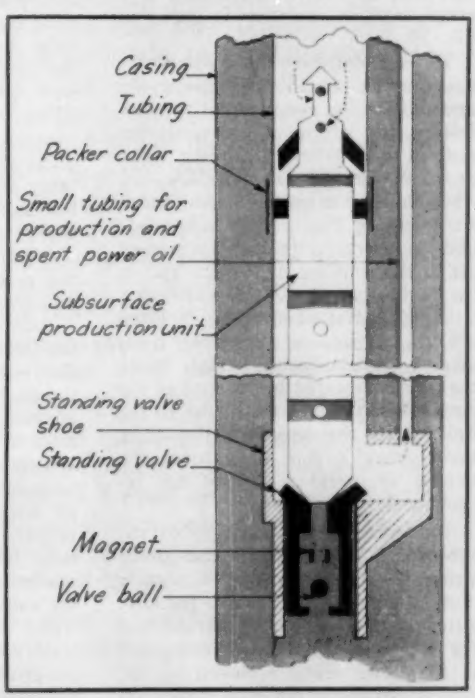
The advantages of the system are ability to lift large volumes of fluid and elimination of the cost of one string of tubing. The disadvantages are: (1) all the gas must be handled by the pump, which may reduce the pump's volumetric efficiency, and (2) paraffin accumulation, in the casing annulus may cause trouble. If the fluid contains a high percentage of water the significance of these problems may be greatly reduced. In such a case, however, consideration must be given to the possibility of casing damage if the well fluid is corrosive.

Free-pump systems. There is no doubt that the development of the "free pump" was one of the most important developments in the evolution of the hydraulic pumping. Ability to bring the pump to the surface for repairs without use of the services of the pulling crew and the pulling unit gives the free-pump system a marked advantage over sucker-rod pumping and over other versions of hydraulic subsurface pumping. This advantage is particularly significant in view of the present trend toward increased depth of pumping.

In a free-pump system two parallel eductors are provided in a well. They are connected at the bottom, at the level of the subsurface unit to form a U-tube. The subsurface unit is pumped down through one of the eductors and is seated in a special bottom-hole assembly. The power fluid is pumped down through the first eductor to operate the unit. Production and spent power oil are lifted to the surface through the other educ-



HYDRAULIC subsurface pumping systems are available in several variations of the basic tool. Fig. 58.
1, casing; 2, tubing; 3, power-oil tubing; 4, subsurface production unit; 5, production and spent-power-oil eductor; 6, production and spent-power-oil tubing; 7, production tubing, and 8, spent-power-oil eductor.



FREE PUMP TYPE of hydraulic subsurface pumping unit can be pumped in or out of the well by changing the flow of power oil through a special valve. Fig. 59.

tor. To surface the unit, the flow of the power oil is reversed at the surface through a special valving arrangement. The power oil is now pumped down the second eductor under the production unit which is unseated and is pumped up to the surface through the first eductor.

In the parallel-type version of the free pump, two parallel strings of tubing are used as eductors, Fig. 58-C. The larger string may be 2 or 2½ in., the smaller string 1 or 1¼ in. The strings may be run together, tied with special clamps, or the large string is run first and the small string is stabbed into special landing head similar to that used in some multizone sucker-rod systems (Part 42). The subsurface unit is pumped down the large tubing to its bottom-hole position. The unit receives the power oil through the large tubing and production, with spent power oil, is pumped up the small tubing.

In the casing-type version of the free pump the unit is circulated up and down and receives the power oil for its operation through the tubing packed off within the casing. The casing annulus serves as the second arm of the U-tube.

An important component of the free pump system is the bottom-hole assembly. Details of its design differ depending on the type of subsurface unit and of the system used. The principle of its operation is shown in Fig. 59.

The standing valve of the assembly has nothing to do with the cyclic operation of the pump end of the subsurface unit which, as previously described, has its own standing valve or valves. The standing valve is closed when the unit is being pumped down. As shown in Fig. 59, the subsurface unit, in operating position, is packed off in the standing valve shoe and in the packer collar. As the unit begins stroking, the standing valve is lifted off its seat and is held open by a magnet until surfacing begins. When the unit is unseated by reversal of the power fluid the downward rush of the fluid closes the standing valve. The two tubing strings now form the U-tube arrangement needed for retrieving the unit.

To assure free circulation of the subsurface unit through the tubing string the tubing is drifted with a dummy pump while run into the well. After the tubing is landed and checked for leaks, a special tubing-cleaning tool is run. The debris removed by the tool is circulated out with power oil before the subsurface unit is run.

The main advantage of the free-pump system has been already discussed. The additional advantage is ability to handle downhole paraffin problems with soluble plugs. The disadvantage of its conventional version is the fact that the use and the capacity of the system is limited by casing diameter since two strings of tubing are involved.

Closed systems. Mixing of clean, spent power oil with the well's production is a source of many problems in hydraulic pumping. To overcome this disadvantage the so-called "closed power-oil" system has been developed in the last several years. In such a system power oil never comes in contact with the well's production. In the bottom-hole assembly a packoff is provided to separate the engine exhaust from the pump-end exhaust of the production unit. Three eductors are needed for separate handling of power oil and well fluid.

Closed systems are available in the conventional and free-pump types. Several variations are available depending on the type of the third eductor used.

In the conventional system the small concentric string conducts the power oil to the production unit and the spent power oil returns through the annulus between the two tubing strings. The well's production is handled either by a third parallel string of small tubing, Fig. 58-D, or by the casing annulus.

In the free-pump closed system the large tubing is used for circulating the subsurface unit in and out of the well and for supplying power oil. Spent power-oil return is through a parallel string of small tubing. Production is pumped either through another parallel tubing string or through the casing annulus. Closed-type casing pumps are run with two tubing strings, concentric or parallel, for circulating the power oil while production is pumped through the casing annulus.

Advantages of the system suggest the field of its application. Power oil does not have to be repeatedly conditioned. The system, therefore, offers advantages where oil is difficult to treat or contains fine sand which is difficult to settle out. Only a small tank is needed for makeup of power oil lost in lubricating the subsurface engine. However, if a free pump is used this tank must have sufficient reserve of oil needed for circulating the subsurface unit in and out of the well. Well testing is simplified, and wells with large volumes of water can be produced without excessive treating-facilities cost.

The disadvantages of the system are the increased investment and operating cost and the space requirements of the third tubing string if the casing annulus cannot be used as the third eductor.

BOOKS

A GLOSSARY OF PETROLEUM TERMS. Published by Institute of Petroleum, 61 New Cavendish Street, London W. 1. 39 pp. 5 shillings.

The preface of this volume explains its purpose.

"Sometimes the words used in technology are standard English used in a special context to convey a particular idea, sometimes they are derived from Latin or Greek (or may even be hybrids) or they may have their origin in humor or even slang.

"The main requirement of a word is that, used in its appropriate context, it should convey clearly and concisely an idea, whether it be of a property, a process, or a piece of equipment.

"To achieve this object it is desirable to have readily available a glossary of special terms used in the petroleum industry with definitions which, even if not exhaustive or highly technical, are accurate and informative."

DESIGN AND CONSTRUCTION OF PORTS AND MARINE STRUCTURES. By Alonzo DeF. Quinn. Published by McGraw-Hill Book Co., Inc., 330 W. Forty-second Street, New York City 36. 531 pp. $16.

Brought together in this book are the essential concepts of designing and building modern shipping-terminal, harbor, and offshore marine structures—along with the working principles and practices that can be adapted to specific project requirements.

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GUIDE TO U. S. GOVERNMENT INDEX. Published by Documents Index, Box 453, Arlington 10, Va. 402 pp. $15.

The U. S. Government, with its many departments, agencies, bureaus, etc., is by far the largest publisher of statistical data in the country. The purpose of this guide is to bring order out of this voluminous output and to make available to those interested in obtaining any type of data a compact, yet comprehensive, reference tool.

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The subject index lists several publications dealing with the petroleum industry.

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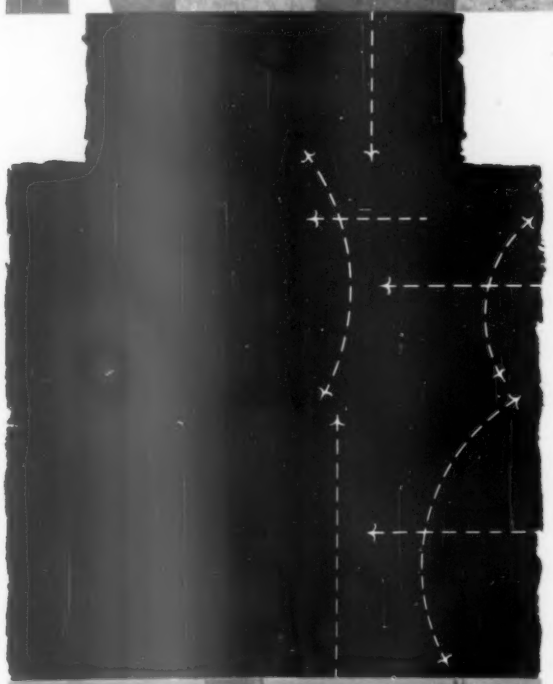

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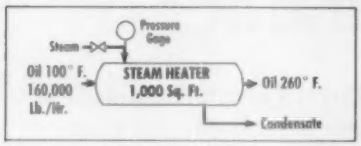
Review of heat transfer, combustion, and chemistry (cont.)



Question 4: A steam heater has 1,000 sq. ft. of heat-transfer area. The oil stream is to be heated from 100° to 260° F. Oil rate is 160,000 lb. per hour. Specific heat of oil is 0.5 B.t.u. per lb. Assume that the average oil temperature in the heater is 180° F. Heat-transfer coefficient for this heater is 100 B.t.u. per sq. ft. for each °F. Remember that the formula for heat-transfer rate is $Q = U \times A \times \Delta T$.

Q × Coefficient × Area × Temperature difference between the two streams.

Determine:

(a) Quantity of heat needed in B.t.u. per hour.

(b) ΔT needed to drive that much heat.

(c) Steam temperature needed to give that ΔT.

Answer 4a:

$Q = M \times C_p \times \Delta T$.

$Q = 160{,}000$ lb./hour × 0.5 B.t.u./(lb.) (°F.) × (260° − 100° F.)

$Q = 12{,}800$ M. B.t.u./hour.

Answer 4b:

$Q = U \times A \times \Delta T$.

$\Delta T = Q/U \times A$

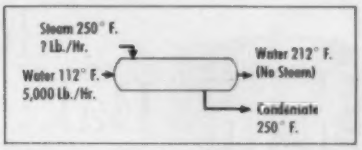
12,800 M. B.t.u./hour = 100 B.t.u./(hour) (sq. ft.) (°F.) × 1,000 sq. ft. × ΔT.

$\Delta T = 128°$ F.

This material taken from process-training-program manual, Bayway, N. J., refinery of Humble Oil & Refining Co.

Answer 4c:

180° F. + 128° F. = 308° F.



Question 5: We want to heat 5,000 lb. per hour of water from 112° F. to 212° F. This is to be done in a steam heater where steam is condensed at 250° F. Latent heat of condensation of steam is 1 M. B.t.u. per lb. Assume steam condensate leaves the heater at 250° F. How many pounds per hour of steam are required?

Answer 5: To heat the water takes:

$Q = M \times C_p \times \Delta T$.

$Q = 5{,}000$ lb./hour × 1 B.t.u./(lb.) (°F.) × (212° − 112° F.)

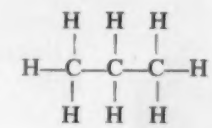
$Q = 500$ M. B.t.u./hour.

If we're going to put that much heat into the water we've got to get that much out of the steam. Since the latent heat of condensation is 1 M. B.t.u. per lb., it will take

$$\frac{500 \text{ M. B.t.u./hour}}{1 \text{ M. B.t.u./lb.}}$$

= 500 lb./hour of steam required

Question 6: Match the formula with the correct name.

(1)


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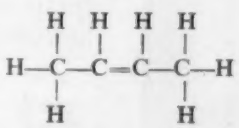

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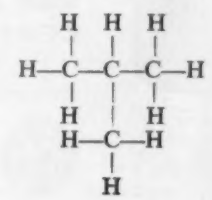


THE FOREMAN'S PAGE

. . . (a) Isobutane
. . . (b) Pentane
. . . (c) Butylene
. . . (d) Propane
. . . (e) Propylene

Answer 6: Number (1) is (d) propane, number (2) is (c) butylene. and number (3) is (a) isobutane.

Question 7: Paraffin hydrocarbons are not very chemically reactive because the carbon atoms are:

. . . (a) unsaturated
. . . (b) unstable
. . . (c) saturated with hydrogen atoms

Answer 7: (c) saturated with hydrogen atoms.

Question 8: Water enters a radiator at 200° F. and is discharged after it has been cooled to 100° F. If it takes 200 M. B.t.u. per day to keep your house warm, how many pounds of water per day would you have to circulate through this radiator?

Answer 8: $Q = M \times C_p \times \Delta T$

200 M. B.t.u./day = M × 1 B.t.u./lb. (°F.) × (200° − 100° F.)

M = 2,000 lb. per day.

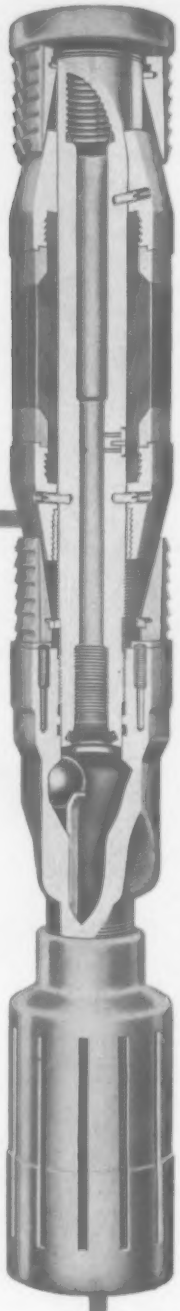
Question 9: Steam enters a radiator and is condensed. If it takes 200 M. B.t.u. per day to heat your house, how much steam will your boiler have to generate? Latent heat of condensation for steam is 1 M. B.t.u. per lb.

Answer 9: For every 1 M. B.t.u. required to heat the house, the boiler will have to generate 1 lb. of steam. Therefore, 200 lb. per day of steam will be required.

Question 10: A furnace is using 10 M.M. B.t.u. per hour of fuel. Of this, 7 M.M. B.t.u. is going to heat the oil. How much is being lost out the stack? What is the furnace effiency?

Answer 10: Heat is being lost out the stack at the rate of 3 M.M. B.t.u. per hour. Only 7 out of every 10 B.t.u. is doing the job we want it to do. Therefore, the efficiency is 70%.

Reliable...best describes the Baker Cement Retainer



BAKER CEMENT RETAINER
PRODUCT 400

RELIABLE: The Baker Cement Retainer rates the word. For here is probably the most thoroughly proved squeeze cementing tool in use today. From the trend-setting original Baker Cement Retainer, to the latest refined models, it has contributed importantly to the success of tens of thousands of high-pressure squeeze operations.

It has been set successfully in thousands of shallow and medium depth wells—and at depths below 20,000 feet. It drills up quickly and easily.

Important Facts About The Baker Cement Retainer

1. It is used for any squeeze cementing operation.
2. It is run on wire line, tubing or drill pipe.
3. Packoff is uniformly positive and dependable at either high or low pressure differentials. Opposed slips hold from either direction.
4. Ability to maintain packoff is independent of fluid pressure, or of set-down weight or tension.
5. A back-pressure valve automatically holds squeeze pressure against the formation. You can swab-test before bringing the back-pressure valve into operation.
6. The Baker Cement Retainer drills up easily and quickly. It's available in drillable, corrosion-resistant cast iron or in fast-drilling magnesium.
7. There's a full range of sizes and a family of accessories to help get the job done in the best way.
8. In some areas it is used as a bridge plug, too. It can be run as a plug—or converted to a plug simply by dropping a ball after its use as a Cement Retainer.

THE BAKER SERVICEMAN is a man who runs Baker squeeze tools with confidence. He is a specialist—Baker tools are his only business. He knows the well-service problems of the area, because that is where he works and lives.

When there is a question about what type of squeeze tool to run, talk it over with a Baker man. He runs both the drillable Baker Cement Retainer and the retrievable Baker Full-Bore Cementer—two of the most respected squeeze packers in the industry. Call him in on your next squeeze-cementing job.

BAKER
CEMENT RETAINER

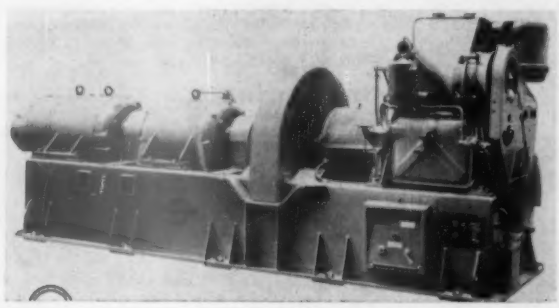
BAKER OIL TOOLS, INC. HOUSTON / LOS ANGELES / NEW YORK

What's NEW . . . in equipment

Mobile welding machine can simplify oil-field welding

OIL-FIELD welders can move rapidly from one job to another with a new mobile diesel-engine-driven welding set, called the Overlander, rated at 300/400 amp. One feature of the unit is the current control. It's designed to give stepless current adjustment between maximum and minimum values at a practically constant open-circuit voltage. Open-circuit voltage can be steplessly varied between 70 and 90 volts to meet the needs of special jobs.

The machine has a polarity changeover switch so the operator won't have to reverse the main welding leads when he wishes to change polarity. Source: **Murex Welding Processes, Ltd.,** Waltham Cross, Herts, England.



Standby generator set

WHEN ELECTRICAL power fails at essential locations in plants or along pipelines, a new diesel-powered generator set developed for emergency standby service can be used to provide 15 kva. of power to assure continuous operation. Rated at 15 kva., 131/230 volts, 50 c.p.s., at 1,500 r.p.m., the machine is fully automatic.

Under normal operation, a synchronous motor developing 25 hp. at 1,485 r.p.m. drives the generator. When power fails, a large flywheel behind the motor keeps the generator operating by continuing to drive the motor and, at the same time, starting up the air-cooled two-cylinder diesel engine. The engine, developing 25 hp. at 1,500 r.p.m., engages the generator through a magnetic clutch and keeps it producing power until the main power source is restored. Source: **Ad. Struver KG,** 11 Niendorferweg, Hamburg 20, Germany.

Need more facts on the items described on these pages?

The manufacturers will gladly supply them. They're shown in bold type, with their addresses. For convenience, send this coupon to the manufacturer.

ITEM _____

_____

OIL AND GAS JOURNAL
July 10, 1961

NAME _____

TITLE _____

COMPANY _____

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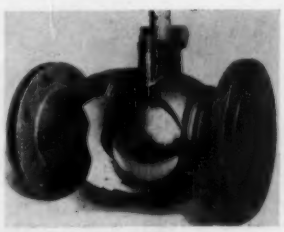
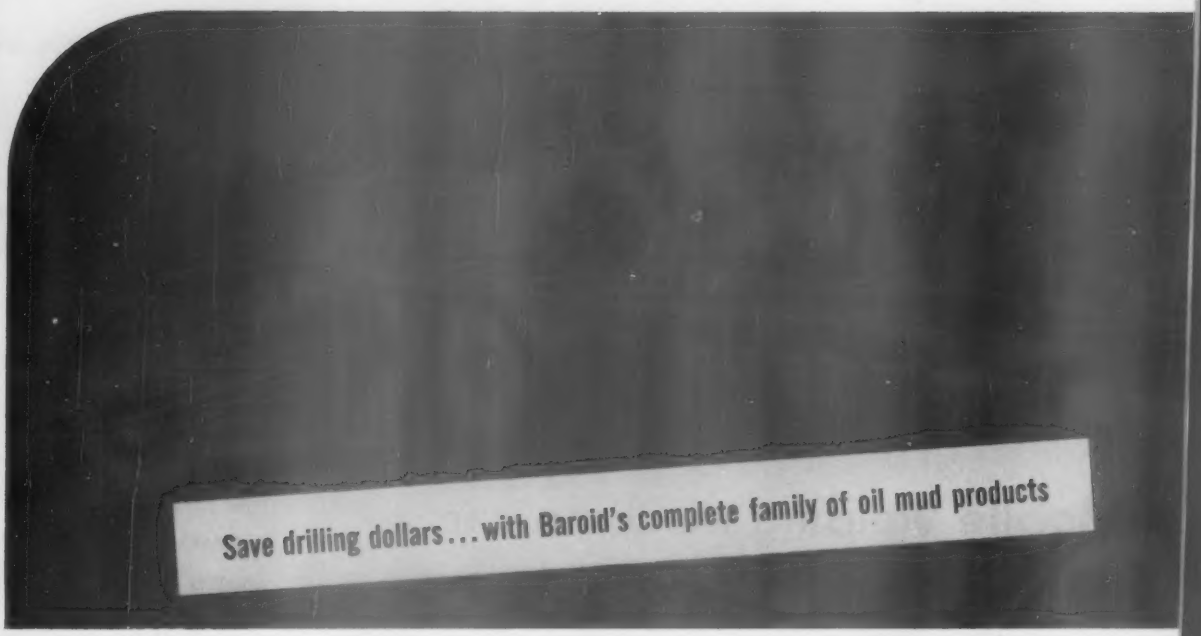


Plug valve with unobstructed bore

Rapid shutoff is provided by a new spherical plug valve now on the market. Features cited for the valve include high reliability, fast action, unobstructed bore, low operating effort, and a tight seal. These are achieved by the use of a spherical plug and an O-ring seal.

A screwed carrier ring keeps the main O-ring seal in contact with the chromed spherical plug.

Besides the O-ring seal for the plug, the valve has another O-ring that seals the two body components and also locks the screwed carrier ring in position. A third O-ring seals the spindle in its housing. The valve comes in sizes from 1 to 4 in. with flanged ends for maximum pressures to 225 psi. and maximum temperatures to 212° F. Source: **Richard Klinger, Ltd.,** Klingerit Works, Sidcup, Kent, England.



BAROID OIL MUD SOLVES DEE

Baroid Field Report: Terrebonne Parish, Louisiana. This case history exemplifies the u

MUD PROBLEM:

To maintain an oil mud having good filtration and flow properties while drilling a 5¾ inch hole with 18 ppg mud at depths to 16,500 feet

WELL DATA

LOCATION: Hollywood Field, Terrebonne Parish, Louisiana
TOTAL DEPTH: 16,570'
BOTTOM HOLE TEMPERATURE: 275 to 300 F

CASING PROGRAM

SIZE, INCHES OD	DEPTH SET, FEET
13⅜	3,499
9⅝	13,490
7	14,328
4½	16,570 (liner)

MUD ADDITIVE PROGRAM

0' to 3,499'	Native mud, water and AQUAGEL*
3,499' to 8,880'	AQUAGEL—caustic soda—Q-BROXIN**
8,880' to 15,100'	Emulsion mud with Gypsum—Q-BROXIN, BAROID*, DMS† and TRIMULSO*
15,100' to 16,570'	Baroid Oil Mud containing INVERMUL*, DURATONE†† and PETROTONE*

TYPICAL MUD PROPERTIES OF THIS BAROID OIL MUD

Depth, ft	15,100	15,487	15,978	16,388	16,521
Weight, ppg	17.5	17.7	17.7	17.7	18.0
Viscosity, sec	74	94	98	104	92
Initial gel, g	2	0	10	10	8
10 minute gel, g	15	12	18	20	18
Filtrate, API, ml	0.0	0.0	0.0	0.0	0.0
Filtrate, 275 F, 500 psi, ml	3.0	4.8	6.2	5.4	4.6
Average Sp Gr, Solids	4.2	4.1	4.1	4.2	4.2
Oil/water, % by volume	47/16	46/17	46/16	45/16	46/15

DISCUSSION: Tight-hole conditions had been experienced while drilling to 15,000 feet in this Terrebonne Parish, Louisiana well. A 7 inch liner to be set (in 8¾ inch hole) at 15,000 feet was stuck at 14,327 feet. Three conditions had to be considered while reaming and drilling to projected total depth: (1) drilling about 1,500 feet of 5¾ inch hole with 18 ppg mud; (2) possibility of differential sticking of drill pipe; (3) extremely small clearances if a 4½ inch liner was to be set at total depth.

SOLUTION: Baroid Oil Mud containing INVERMUL emulsifier, DURATONE filtration control agent and PETROTONE suspending agent was selected to drill the bottom 1,470 feet of hole. This Baroid Oil Mud was used because of excellent control properties (API filtration held at zero, filtration at anticipated BHT of 275 F to 300 F could be easily controlled, flow properties compared to those of water-base muds), and because maximum hole stability and lubrication would be attained.

At 14,327 feet the water mud was displaced with approximately 1,500 barrels of pre-mixed 17.5 ppg Baroid Oil Mud. The 7 inch liner was cemented, cement was drilled, and reaming to bottom was begun. While reaming to bottom, the water mud in the hole (about 5% of total volume) was incorporated into the Baroid Oil Mud with no difficulty.

The 5¾ inch hole was drilled from 15,100 to 16,570 feet at about the same penetration rates normally attained with water muds. Maintenance of the Baroid Oil Mud consisted of periodic additions of diesel oil, INVERMUL emulsifier and DURATONE filtration control agent. A 4½ inch liner was successfully set at total depth.

*AQUAGEL, bentonite; BAROID, weight material; TRIMULSO, surfactant; INVERMUL, emulsifier; PETROTONE, suspending agent; DRILOIL, oil mud concentrate; and DRILTREAT, stabilizer; are Registered Trademarks of Baroid Division National Lead Company.
**Registered Trademark, Puget Sound Pulp and Timber Company.
†Registered Trademark, Socony Mobil Oil Co., Inc.
††DURATONE, filtration stabilizer, is a Trademark of Baroid Division National Lead Company.

BAROID—*Still Pioneering Drilling Mud Research • Engineering • Marketing*

ORILLING PROBLEM (BHT 300 F)

F one type of Baroid Oil Mud to solve this particular problem.

The Baroid family of oil mud products allows the operator to select an oil mud having the properties suitable for his particular drilling problem. This approach has long been used in the selection and treatment of conventional water muds but is new to oil muds. These oil mud properties can be modified by treatment with INVERMUL, DURATONE, PETROTONE, DRILOIL* and DRILTREAT*. Baroid's new approach to oil muds has resulted in their successful use for drilling, coring, completion, perforating, gravel packing, packer fluids, freeing stuck drill pipe, and for fishing.

In this case history in Terrebonne Parish, Louisiana, a Baroid Oil Mud was selected as the practical solution to the problem of drilling a 5¾ inch hole at depths to 16,500 feet and temperatures to 300 F. At 15,100 feet an INVERMUL-DURATONE-PETROTONE Oil Mud was used to displace the water mud. Periodic additions maintained the excellent filtration and flow properties of the oil mud. Drilling was trouble-free and completion successful at 16,570 feet.

INVERMUL, a free-flowing powder, the basic ingredient in this Baroid Oil Mud is an active, readily oil-dispersible emulsifier that stabilizes the emulsion and protects productive formations by controlling filtration.

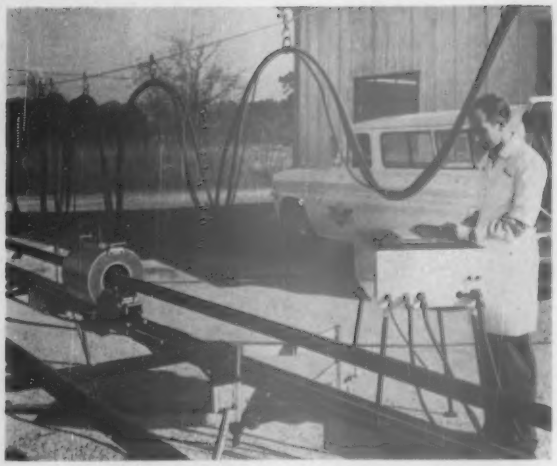
PETROTONE is a dry powdered colloid that imparts solids-suspending properties to all types of oil muds and is easily mixed. The usual amount added is from 1 to 5 ppb of oil mud. PETROTONE is stable at the highest bottom-hole temperatures presently encountered in drilling.

DURATONE, a unique organic colloid, controls filtration of all types of oil muds at the highest bottom-hole temperatures. The development of DURATONE and PETROTONE as companion products to INVERMUL has diversified and extended the application of oil muds. This is another example of how Baroid's customer-oriented program of research and engineering saves you drilling and completion dollars and keeps your operations on schedule.

BAROID

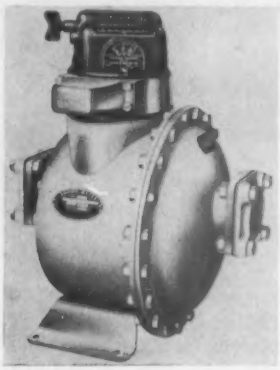
BAROID DIVISION NATIONAL LEAD COMPANY
MAIN OFFICE: P. O. BOX 1675, HOUSTON 1, TEXAS

6174



Electronic tubing inspection

A NEW electronic inspection unit for used oil-field tubing has been recently put in service. A four-stylus tool, the Scanagraph scans each 90° segment of the pipe separately and simultaneously. It thus rapidly and accurately detects and records flaws, pitting, and transverse cracks. The result is a precise recording of the condition of the inspected tubing. Source: **Plastic Applicators, Inc., Pipe Inspectors Div.,** P. O. Box 7631, Houston, Tex., U.S.A.



New meters for crude, products

Measurement rates of 80 and 120 g.p.m. can be handled by two new meters now on the market. Model 40D is rated at 80 g.p.m. and Model B50D at 120 g.p.m. Designed to handle crude and refined products as well as many other liquids, the meters are said to be particularly suited for small loading racks, pipelines, LACT units, and similar services.

Featuring double-case construction, the meters have a 125-psi. working pressure. Both the inlet and outlet connections are in line. Both models can be equipped with a balanced outlet valve for quantity control operation where automatic delivery of predetermined quantities is desired. Source: **Ralph N. Brodie Co.,** Alvarado & W. 137th Ave., San Leandro, Calif., U.S.A.

●

Wire-line operated pipe cutter

Where unobstructed inside access of the tool is possible a new pipe cutter has been developed for cutting tubing, drill pipe, or casing. The Kirby Jet pipe cutter, a nonconductor wire-line-operated tool, cleanly and uniformly cuts the pipe with a minimum flare to the pipe outside diameter and without damage to the surrounding casing, the maker says.

The tool is run on a nonconductor measuring line. When it reaches the desired cutting depth, a go-devil is placed on the line and released from the surface. When the go-devil contacts the releasing head, this releases a spring-loaded battery chamber. The cutter charge is then fixed electrically.

Cutter sizes range from 1⅞ to 2¾ in. for severing tubing sizes from 2⅜ to 3½ in. Source: **K & G Oil Tool and Service Co., Inc.,** 2703 Sackett, Houston 19, Tex.. U.S.A.

●

Compact needle valve

Tight sealing at pressures to 6,000 psi. is claimed for a new panel-mounted soft-seat needle valve developed for pneumatic and metering services. Available in two types of stainless steel, aluminum alloy, and other materials, the valve can be easily installed on panels as only the valve handle and lock nut need be removed. It can be repaired without removing it from the line. The valve is available with ⅛, ¼, and ⅜-in. pipe-thread connections. Source: **Dragon Engineering Co.,** 13457 E. Excelsior Dr., Norwalk, Calif., U.S.A.

●

Stack arrestor for vessels

Attached to the top of the stack on oil-field vessels, a new stack arrestor promises to prevent the propagation of flame or the release of hot carbon particles to surrounding gas areas. Applicable to vessels located in areas where the danger of fire is present, the arrestor is equipped with an aluminum flame cell suitable for a maximum flue-gas temperature of 900° F. For higher flue-gas temperature, stainless-steel cells are available. Models are available for gross heat releases from 47,800 to 2,060,000 B.t.u. at 900° F. with a pressure drop of 0.05 in. water. Source: **Enardo Mfg. Co.,** 2729 Charles Page Blvd., Tulsa, Okla., U.S.A.

This is Mister Right-On-Time

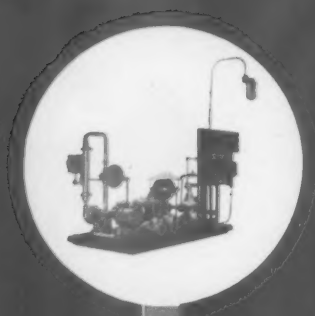
Flight Captain Ted Raines—like all Braniff pilots—shares an exceptional reputation for punctuality. Braniff, as government statistics prove, is a leader in on-time records.

"On-timeliness" is just one of many Braniff bonuses. Consider, for example, our Silver Service meals . . . the "looked-after" feeling you get from charming Braniff hostesses . . . and all the other friendly Braniff folks who serve you from start to destination. Yes, and the luxury of Braniff's new El Dorado Super Jets.

Men in the oil and gas industries also appreciate our extensive schedule of jet flights between Texas and New York, Chicago, Denver, and Mexico. Actually, Braniff serves 50 U.S. cities, and from Texas or New York/Miami (via Braniff-Eastern thru-jet service), 10 Latin American countries.

Next time you're off on a business or pleasure trip, fly the airline that promises a friendly lift with every flight.

BRANIFF *International* AIRWAYS

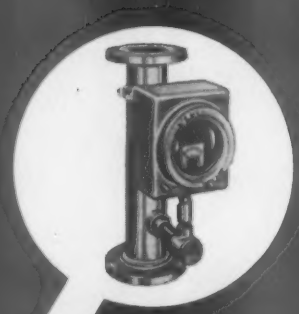


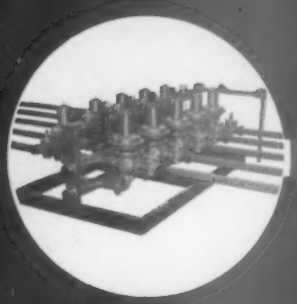
AUTOMATION

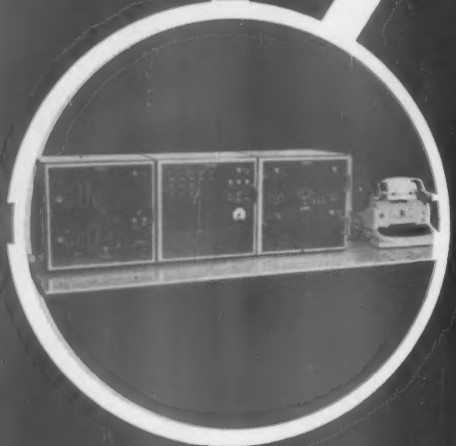
You can have it... step by step ...or complete in one leap!

Here are three good reasons for automating with BS&B...

- **ONE SOURCE FOR ALL EQUIPMENT.** Production and processing equipment, electro-pneumatic controls and valves are built and sold by one diversified manufacturer.
- **DESIGNED AND BUILT WITH EXPERIENCE.** Systems and components are designed and built by men who have pioneered oilfield automation.
- **RELIABLE SOURCE OF SUPPLY.** Over a long period of time BS&B has earned a reputation for reliable service to its customers and to the oil industry.







BS&B Automation Headquarters: Box 1714, Oklahoma City, Oklahoma

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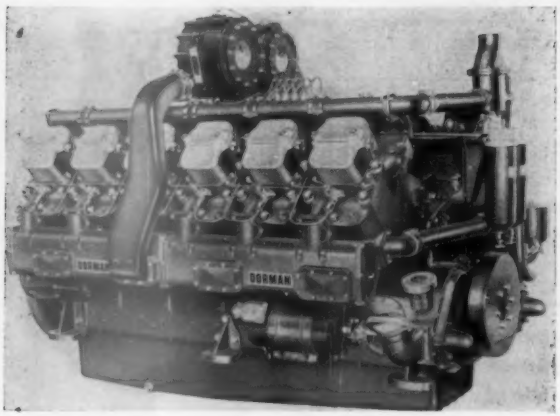
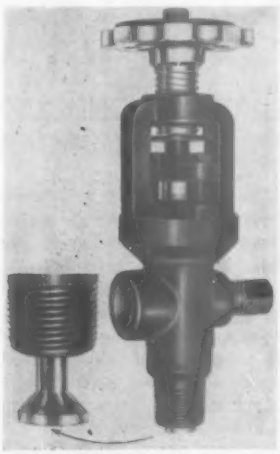


Compact 12-cylinder diesel engine

A VEE TYPE of diesel engine with the cylinders in banks of six set at an included angle of 90° is available. Its two six-element fuel pumps are positioned within the vee.

Available either normally aspirated or turbocharged, the engine is expected to prove useful for driving drilling rigs, compressors, pumps, or generators. Maximum output is rated at 700 hp. Dimensions are: length, 81 in.; width, 50 in.; and height, 48 in. Bore and stroke, respectively, are 6¼ by 6½ in. Source: **W. H. Dorman & Co., Ltd.,** Stafford, England.



Reciprocating stem on drain valve designed to eliminate galled seat

No rotating action occurs as the reciprocating stem on a new drain or sampling valve moves to or from the valve seat in a straight line. This feature is designed to prevent seat wear due to galling of the seating surfaces.

The No. 23 valve is self-draining and designed for installations where it is desired to have the valve seat inside the wall of the pipe or vessel. This keeps liquid from staying in the area between the liquid container and the valve seat when the valve is closed. The valve stem seats on the outside of the valve body so that liquid won't remain in the nipple or valve.

Constructed with a carbon-steel body and stainless-steel stem, the valve has a 1-in. tank connection, ¾-in. female drain connection, and a ½-in. purge connection. Source: **Jerguson Gage & Valve Co.,** 80 Adams, Burlington, Mass., U.S.A.

•

For better heat transfer: helically gilled tubes

The transfer of heat between gases and liquids continually challenges designers to improve the efficiency of the process. One answer now offered is helically gilled tubing. In this tubing, the outer surface of the tube is extended by forming gills from the tube wall in suitably shaped tools. Thus, the gills are integral with the base tube and disposed helically around the tube periphery.

The tubes can be bent without the risk of deformation, and the bending radius applied to plain tubes need be only slightly increased for the gilled tubes of equivalent root diameter. Too, the gills may be removed from parts of a tube to make bending easier.

Tube sizes available range from 5/16-in. diameter at the gill root to 6-in. o.d. Lengths up to 21 ft. can be produced. Source: **Accles & Pollock, Ltd.,** Oldbury, Birmingham, England.

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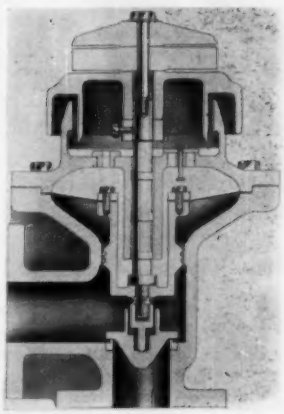


Pressure-relief valve for pressure and vacuum stills

Even under corrosive conditions a dead-weight type of pressure-relief valve now being sold cannot stick, the manufacturer claims. This feature is achieved by making the valve oil-sealed. The Kernon pressure-relief valve is designed to withstand high temperatures for long periods without attenton, yet remain completely free to function properly when required. The valve is said to be suitable for both pressure and vacuum stills and all classes of chemical-plant operation under corrosive conditions.

It has a special dashpot feature that allows rapid lift but floating-action closure, thus preventing damage to the valve and seat. The valve comes in sizes from 1 to 4 in. Source: **Robert Harlow & Son, Ltd.,** Heaton Norris, Stockport, Cheshire, England.

MARTIN RUBBER & DUCK RINGS give excellent life in dirty abrasive fluids . . . high or low gravity . . . much or little water . . . shallow or deep wells. They last for years in the easier pumping wells. Replacement rings cost comparatively little.

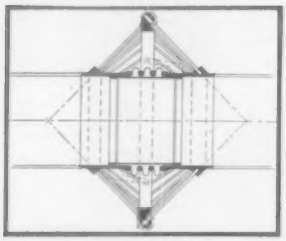
MARTIN PLUNGER BODIES, precision grooved, drilled and threaded (no underneath fluid passage), usually last for years. Tube or barrel costs are often cut in half.

The replaceable SYNTHETIC RUBBER GUIDES in MARTIN CAGES last longer than any metal, and the cushioning of the ball increases your ball & seat life. Results are often truly amazing. (Patent No. 2,591,174)

Write for our new catalog or see it in the Composite (24th Edition). All products sold thru supply companies.

JOHN N. MARTIN
Manufacturer
9 W. BRADY STREET • TULSA, OKLAHOMA

What's NEW . . . in equipment



New-type expansion joint for high-pressure piping

Thermal expansion in high-pressure, high-temperature refinery and petrochemical piping may be readily handled by a new expansion joint developed for gas ducting at an atomic power plant. Presently, designs are being prepared for an operating temperature of 1,200° F.

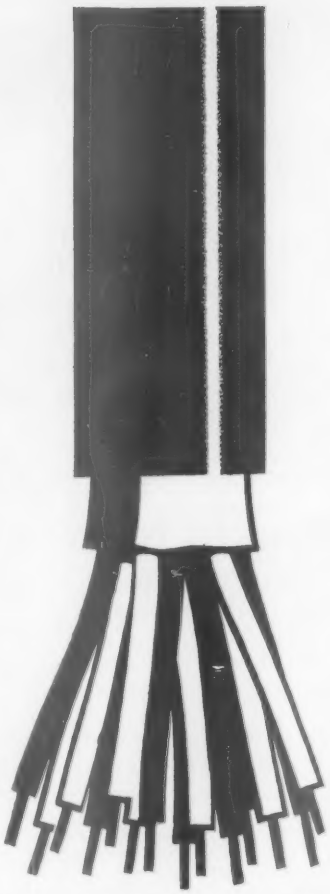
The piping restraint works entirely on principles of elastic deformation. It consists of a large number of high-tensile-strength bars. These are grouped in two frustoconical assemblies around the periphery of the duct. In the axial direction, it acts as a stiff connection. Angularly, it can deform by transverse bending of the bars to a degree and at a rate which can be accurately determined. Because the bars are uniformly spaced around the duct periphery, the joint is equally flexible in any direction. Source: **Richardsons, Westgarth & Co., Ltd.,** P. O. Box 2, Wallsend-upon-Tyne, Northumberland, England.

•

Safety control for engines

When engine speed of internal-combustion engines exceeds the regular high idle speed by 100 to 150 r.p.m., a new safety control valve trips and shuts off the air supply to the engine to prevent overspeed.

Called an overspeed air-shutoff valve, the device is designed to prevent a runaway engine but not to act as a speed-control governor. It operates on the principle of an over-center-positioned lever, spring-loaded to allow the volume of air flow acting on a butterfly valve to trip or move the butterfly lever past center. It can be used on either naturally aspirated or turbocharged diesel engines. Source: **Waukesha Motor Co.,** Waukesha, Wis., U.S.A.



MULTIPLE-CONDUCTOR T/C EXTENSION CABLE

Available with from 4 to 48 pairs of solid-conductor temperature-compensated wires. Each wire is numbered, individual conductors are twisted into pairs, each pair is color-coded by wire type. No conduit needed. Supplied in custom and standard constructions. From this one dependable source come thousands of other accessories to help your instruments perform at their very best.

Get details from your Honeywell field engineer, or write today for Catalog G100-2.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell
First in Control
SINCE 1885

What's NEW

. . . in literature

Bulletin describes new water taxis

Two vessels, 51 and 54 ft. in length, are featured in this eight-page publication for use as crew boats, fire and rescue boats, or inspection vessels. The literature offers interior and exterior views of the boats, dimensions, electrical system and outfitting, and specifications

Two other bulletins are also being offered free by this manufacturer. One is concerned with pneumatic-powered derricks designed especially for offshore oil-producing platforms and similar applications. With capacities up to 5,000 lb. and boom lengths from 9 to 20 ft., the derricks are said to be ideal for docks, hazardous locations, and handling cargo, supplies, and boats.

The other publication deals with a new ice-making machine available in sizes to make 150 to 2,000 lb. per day. Complete in a single package, the machines are equipped with an electric motor (a.c. or d.c.) or gasoline-engine drive. These ice makers are presently in operation in the United States and many foreign countries. Source: **Equitable Equipment Co., Inc.,** 410 Camp St., New Orleans 12, La., U.S.A.

Free bulletin discusses inorganic zinc coating

Written in clear, understandable terms, Bulletin 400 describes the galvanic principle of inorganic zinc protection, both in immersion and nonimmersion service. The four-page publication details Carbo Zinc 11 with and without topcoats as a tank lining and as a high-temperature coating. Included are physical properties and application advantages. Source: **Carboline Co.,** 32 Hanley Industrial Court, St. Louis 17, Mo., U.S.A.

Controlled-capacity pumps

Bulletin MP-29, available free to interested persons, consists of 12 pages of basic information, performance specifications, and principles of operation. The 12-page bulletin offers cutaway drawings pointing out working parts, construction materials, pressure-capacity tables, and typical control applications. Source: **Clark-Cooper Div., Frederic B. Stevens, Inc.,** Palmyra (Burlington County), N. J., U.S.A.

Ram-type drain valves subject of new folder

Detailed in eight pages are features of six hand-wheel-operated models in 1 through 4-in. sizes with either 60° straight-neck or 45° curved-neck discharge. Special designs to 6 in. are available and also for air cylinder or motor-drive operation. According to the folder, the drain valve is designed so that in the closed position the piston or ram extends into the vessel and eliminates the possibility of the outlet becoming plugged. Source: **Strahman Valves, Inc.,** Nicolet Ave., Florham Park, N. J., U.S.A.

Pipe-wrap tape

Positive protection for buried pipe is promised by Arno pipe-wrap tape with polyethylene backing to counteract rust, acids, alkalies, and other soil contaminants, as outlined in a

from American Systems Incorporated...

AN AUTOMATIC RECORDING GAS TITRATOR

Austin Recording Gas Titrator Model 4010

The fully automatic Austin Gas Titrator 4010 is designed for continuous on-line measurement of sulfur in natural gas and plant process streams. Developed for corrosion and odorant control analysis in transmission and distribution systems, the 4010 continuously records on a strip chart its analysis of sulfur compounds. This accurate, reliable analytical instrument is adaptable to virtually any installation in the natural gas, LP gas, petrochemical, and chemical processing industries.

ANALYSIS CYCLE:
Complete analysis and recording of major sulfur constituents once each hour

RANGE (H_2S):
0 to 0.5, 0 to 2.5 grains/100 SCF Full Scale

For additional information write:

AMERICAN SYSTEMS *Incorporated*
1625 East 126th Street, Hawthorne, California
AN AFFILIATE OF SCHLUMBERGER

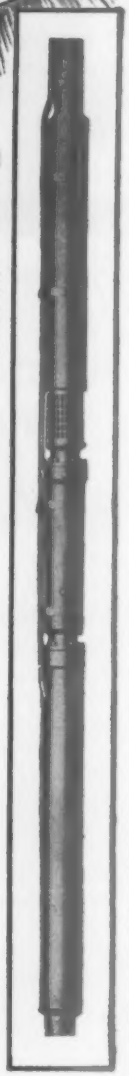
INCREASE PROFITS WITH REDA Submergible PUMPS

REDA GIVES YOU THESE COST SAVING FEATURES AND DOES THE JOB BETTER!

- Lower cost for installation, operation and maintenance.
- 250 to 18,000 BPD capacities
- Depths to 10,000 ft.
- Corrosion-resistant construction
- Long life — dependable service
- A complete line to meet pumping requirements

and

INVESTMENT COST IS FAR LOWER WHEN YOU CHOOSE REDA FOR YOUR PUMPING NEEDS.



Write or call for more information. Reda engineers will be pleased to assist and help plan your operations.

REDA PUMP CO.
BARTLESVILLE, OKLAHOMA
Manufacturers of submergible motors and pumps for over 35 years — for oil, brine and water wells, gasoline and jet fuel —

two-page bulletin. The literature offers descriptions, properties, uses, and benefits. Source: **Arno Adhesive Tapes, Inc.,** Rt. 20 at Ohio, Michigan City, Ind., U.S.A.

Moisture-density determinations for civil-engineering works

This brochure describes a nuclear system for taking rapid field measurements of soil moisture content and soil density. The system consists briefly of a radioactive source, a detector for the source, and a scaler to indicate the amount of radiation detected. Features of the system, as introduced in the brochure, consist of extreme portability, accuracy, simplicity of use, virtual elimination of radiation hazards due to low energy sources used, and low cost. Source: **TESTlab Corp.,** 3398 N. Milwaukee Ave., Chicago 41, Ill., U.S.A.

Complete control with two-way radio

Bulletin ECR-793 tells how mobile communications integrate operations of any business where vehicles are used for sales, service, delivery, or supplies. It adds that all company vehicles can be put on a single system or set up on separate networks, depending on the needs of the individual business. Source: **General Electric Communication Products Dept.,** Box 4197, Lynchburg, Va., U.S.A.

Direct-reading vibration meter

This newly announced four-page brochure describes a battery-operated, hand-carried vibration meter with high-gain, transistorized circuitry. Bulletin PR-9252 gives advantages of this self-contained instrument which reads amplitudes of both absolute and relative vibrations directly on a large meter dial. The publication contains complete internal calibration of both meter and accompanying transducer. It relates that the instrument weighs only 5 lb., measures 9½ by 5 by 4 in., with special terminals for connecting the meter's output into an oscilloscope or high-speed recorder for permanent records. Source: **Korfund Co., Inc.,** Cantiague Rd., Westbury, L. I., N. Y., U.S.A.

BIF POSITIVE CONTROL OF MATERIALS FLOW

Want to get into the #4 and #5 oil market without costly, additional tankage? Want to free any existing #4 and #5 oil tankage you have for other service? Stock only #2 and #6 . . . deliver these and any intermediate grade simultaneously, directly to your tank trucks with B-I-F's compact TC Blender.

Free Facts

Stock TWO, sell THREE . . . at savings up to ½¢ per gallon. For greatest flexibility in end-product specifications, maximum production from existing real estate and personnel, lower taxes, and reduced inventory . . . request free FACTS today!

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377 HARRIS AVENUE, PROVIDENCE 1, RHODE ISLAND

▶▶▶ Equipment Men Notes

Frank M. Barry is appointed
... district sales manager of Colorado Fuel & Iron Corp.'s Northern California district, according to J. N. Counter, general manager of sales, western division. Barry has been serving as assistant to the district sales manager since June 1959. Previously he worked as assistant to the Realock product manager, having joined CF&I in 1950 as a Realock sales representative. Counter also announced that Thomas D. Guy has been named assistant sales manager of Barry's district.

New officers are installed
... by the Natural Gasoline Supply Men's Association at a recent meeting of the organization's board of directors. Serving as president for the year 1961-62 is C. P. Stanley, vice president of Dresser Engineering Co., Tulsa, since 1956.

Other men taking office at the meeting were Vice President F. W. Bell, division manager for Brown & Root, Inc., Houston; Vice President W. M. Gebo, chief engineer for Ingersoll-Rand Co., Tulsa; and Treasurer James S. Kone, president of James S. Kone Co., Amarillo.

David R. Davis joins

D. R. Davis

... Charles Wheatley Co. as coordinator of sales, advertising, and pricing, according to Charles Wheatley, president of the Tulsa manufacturer of "Steam - Flo" valves. Davis has been associated with the valve industry for more than 25 years. He formerly served as sales engineer with Lunkenheimer Co., Pacific Valves, Inc., Hancock Division, Manning, Maxwell & Moore, and Grove Valve & Regulator.

Glenn Wilson named to manage
... the sales technical divisions of the international division of Dorr-Oliver, Inc., Stamford, Conn. The appointment to this newly created post is part of a program aimed at improving D-O service to customers in South America, Africa, and Asia. Wilson has been with the organization since 1928. Most recently he was director of technical coordination.

Bovaird Supply Co. recognizes

T. C. McCuistion

... and expands its sales department, according to R. E. Batchelor, vice president. T. C. McCuistion has been advanced to sales manager of tubular products; W. G. Rudd, sales manager of rotary equipment; and C. F. Hamm, sales manager of general products.

McCuistion joined Bovaird in 1935. Prior to this latest promotion,

W. G. Rudd

C. F. Hamm

he was manager of general product sales. Rudd joined the company earlier this year as manager of tubular sales. Hamm, a 24-year company veteran, most recently was special sales representative.

The company also announced the change in assignment of three store managers. Gentry Adams has been transferred from Pratt, Kans. to store manager at Great Bend, Kans. R. E. Batchelor, Jr. is now manager of the Liberal, Kans. store. W. F. McIlvain has been moved to Farmington from his former position as manager of the Great Bend store.

S. A. Windham named salesman
... for Jones & Laughlin Supply Division at Shreveport, it was announced by W. L. Wolfe, vice president of sales. Windham joined J&L as storeman at Oil City, Miss. in 1952. He was transferred to Rodessa, La. in 1954, and was promoted to store manager there in 1957.

Louis G. Good forms sales firm

... in Charlotte, N. C. to act as sales representative for eight industrial instrument product lines in the Carolinas and southern Virginia. Good's company—Systems Service Corp.—will represent Mason-Neilan, Annin, De/Var, Panalarm, Powertron-Ultrasonics, Daystrom-Weston, Barton Instruments, and Meriam. Good was formerly vice president of Panellit Service Corp.

Iverson Supply Co. moves
... its headquarters office from Tulsa to 910 Fidelity Union Tower, in Dallas. At the same time it was announced that a sales office is being established in Tulsa at 1011 Mayo Building. M. C. Niblack, vice president of sales, is in charge.

Dowell Division opens station
... for oilwell cementing in Houma, La. Under the management of Russell Norwood, the station will provide cementing services to well locations in southern Louisiana. The installation provides storage facilities for bulk cement and admixes as well as blending, weighing, and metering equipment for loading of cement transports. Dowell maintains other cementing stations at Hattiesburg, Miss., Beaumont, Houston, Victoria, Alice, and Mission, Tex.

Robert C. Hicks added to staff
... of Edward Valves, Inc. as a sales engineer covering West Texas, including the Panhandle, and southeastern New Mexico. The announcement was made by R. A. Durand, sales manager of the subsidiary of Rockwell Mfg. Co. Since joining Edward in 1958, Hicks has been assigned to the Chicago and northern Indiana sales territory.

Varec, Inc. becomes new name
... of Vapor Recovery Systems Co., according to Ray V. Long, president. Varec, Inc. was adopted as the corporate name because the

Varec trademark is well-known and offers a title for future expansion into new operations.

Tex-Tube names C. S. Hightower ... as manager of its West Texas division with headquarters in Midland. Hightower goes to his new position from Dallas where he served as field engineer for Tex-Tube, Inc. the past year. In his new capacity he will direct sales and service of the company's tubular goods throughout West Texas, New Mexico, and Arizona.

Go, Inc. announces acquisition ... of Go Oil Well Services, Inc. facilities in Tyler, Tex. and Shreveport, according to Jack Vaughan, president of the firm. The oil-field-service company now operates all equipment and facilities formerly owned by Go Oil Well Services, Inc.

Dr. Heinz Heinemann becomes ... manager of research and development for M. W. Kellogg Co., a subsidiary of Pullman, Inc. In this position he will be responsible to the vice president in charge of research and development, and will manage the chemical research and the chemical and mechanical-engineering-development activities of the company. Dr. Heinemann joined Kellogg's research staff in 1957. Prior to that he was in charge of a research section at Houdry Process Corp.

John R. Hodgson assumes post ... as sales representative for Kerotest Mfg. Co., Pittsburgh, announces E. N. Wrenshall, Kerotest's vice president and general manager. Hodgson will represent the company's Steel Valve Division.

Fischer & Porter Co. appoints ... George Bazaco and O. A. Seglem to the company's sales management staff, announces Lawrence R. Greenhaus, general sales manager. Bazaco becomes field sales manager, with responsibility for technical direction of the F&P sales force. Seglem assumes duties as field administrator, with responsibility for administration of the company's field office operations. Bazaco previously served as the company's petroleum-industry manager, while Seglem was manager of the F&P Ohio Valley sales region.

George Bazaco

O. A. Seglem

Republic Supply Co. opens store ... at Vernal, Utah under the supervision of Daniel Martin, reports Frank E. Gault, Republic's vice president in charge of sales. Martin has been a sales representative in the Vernal area for the past year. Since joining Republic in 1957, he worked at Farmington and Casper before his transfer to the Vernal area.

Assisting Martin as field sales representative will be M. E. Ferguson, formerly assigned to Republic's Farmington store. Larry Taylor, until now assigned to the Casper store, becomes head floorman at Vernal.

Robert Moberly named manager

. . . of the Houston pipe-coating plant of Plastic Applicators, Inc. He was transferred to Houston from Dallas. Moberly, who joined Plastic Applicators in 1956, has had 12 years of oil-field and sales experience.

Gates Rubber names engineers

. . . in Oklahoma, California, and New Jersey. Harold E. Damron takes over as industrial field engineer with headquarters in Tulsa. His previous experience includes more than 10 years in power transmission and rubber-products-sales engineering. Orville H. Moseley, field engineer in Tulsa and a Gates employe since 1957, has been transferred to the district office in Oklahoma City.

Steven H. Breeze has been transferred from Oakland to a field-engineering post in the San Mateo and San Jose counties of California.

Henry R. Berry, a 16-year sales and marketing veteran with Gates, has been assigned to Clifton, N. J. as an industrial division field engineer. Berry's previous assignment was in molded-rubber sales in Denver.

New company is established

. . . at Fort Wayne, Ind., to represent Rockwell Mfg. Co. and specialize in system design and application

J. E. Doelling

R. J. Ryan

of liquid meters to all flow-control requirements. Principals of the new firm—Systems Engineering & Sales Co.—are James E. Doelling and Richard J. Ryan. Doelling was formerly vice president of Bowser, Inc.'s Industrial Division. Ryan was manager of Bowser's meter and general line department.

In addition to the Rockwell line of meters, pumps, tanks, and filters, the company will distribute a line of hand pumps, fuel dispensers, and liquid storage and handling equipment. Systems Engineering & Sales will also design custom systems for handling, storage, and processing of liquids.

Gurtler, Hebert & Co., Inc. reports industry acceptance

. . . of diesel hammers in offshore work. With yard facilities set up in New Orleans, Morgan City, Lafayette, and Cameron, the company carries on most of its work in the Gulf of Mexico, from the mouth of the Mississippi west to Corpus Christi.

A new type of piledriving machine, utilizing a new energy source, recently became available on the American market. The machine is essentially a one-cylinder diesel engine. The use of this hammer in connection with offshore oil work was pioneered in the gulf states area by Gurtler, Hebert & Co., Inc., who first adapted the equipment for use with offshore drilling rigs. This enables rigs to drive their own con-

CONTROLLED DRILLING

INDICATING AND RECORDING

Weight
Pump Pressure
Torque
Penetration
Rotary Speed
Pump Speed

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MARTIN-DECKER CORPORATION, DEPT. P-90
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World's principal manufacturer of Oil Well Drilling Instrumentation

DESIGNED FOR MODERN PIPING!

THE ECON-O-MISER BALL VALVE

COMPARE THE ECON-O-MISER WITH ANY ON-OFF VALVE!

- Remove 4 bolts — the center section lifts out — unions are eliminated!
- ¼" through 6" size range
- Quarter-turn operation
- Smooth round **Two Way** Flow
- No metal to metal contact — wiping action assures longer life

WRITE FOR COMPLETE TECHNICAL INFORMATION!

WORCESTER VALVE CO., INC. | WORCESTER 10, MASS.

Take a tip from this contractor...

TRADE UP AND MAKE MORE PROFIT

New D6B Tractors do work 30% faster— cut fuel costs for Carl Rumage

Working in rain, this new D6B Tractor digs a salt water pit 40 ft. x 75 ft. x 10 ft. In spite of slippery ground and exceptionally tough, sticky soil, the tractor will finish the job in a single day. Mr. Rumage keeps his equipment moving — handles soil conservation work when not busy in the oil fields.

Like most contractors today, Carl Rumage, owner of C. A. Rumage Co., Vernon, Texas, is fighting the squeeze on profits every way he can. He's found one of the best ways is to trade up for new, more productive machines—even if existing equipment is working fine. Two new D6B Tractors, recently purchased by this contractor, provide a good example.

Comparing the new D6 with the old D6, Carl Rumage says, "Our new machines do the work at least 30% faster . . . and they do it on less fuel! Trading up to the new D6 is sure paying off for us."

There's good reason for Mr. Rumage's enthusiasm. The new 93 HP Cat D333 Diesel Engine, for example, has 25% more lugging ability than the previous model. A more comfortable operator's compartment and convenient controls help keep operator efficiency high. A new hydraulic bulldozer, with quick-drop valves, gives faster operation, increased productivity.

The new D6B helps keep down operating costs in several ways. Its easy-breathing Cat Engine can operate on high-energy, low-cost fuels such as No. 2 furnace oil. It has a dry-type air cleaner that eliminates the expense and bother of handling filter oil, can be serviced in five minutes, and keeps 99.8% of air-borne dirt out of the engine.

The long-life Caterpillar oil clutch usually gives up to 2000 hours of service before it even needs adjustment. Lifetime lubricated rollers that never need attention until rebuild time are a real convenience and save in maintenance costs.

Trading up to new, more productive D6B Tractors certainly made sense for Carl Rumage. A similar trade may help solve your profit problem. Your Caterpillar Dealer can help you decide and can demonstrate the production advantages of new Cat-built machines. See him today.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

BETTER MACHINES MEAN BETTER PROFITS

ductor pipes without the aid of auxiliary equipment, resulting in substantial cost savings.

Wells Hudson is sales manager . . . of industrial coatings for the Protective Coatings Division of Pittsburgh Chemical Co. He was formerly a production manager with the division. In his new position, Hudson will direct Pittsburgh Chemical's sales program for supplying the firm's coal-tar based and asphalt-based products. Hudson joined the parent company, Pittsburgh Coke & Chemical, in 1957 as project manager in commercial development. He became product manager for tar products of the Protective Coatings Division in 1959.

Dale F. Morgan is appointed . . . manager of sales administration for Union Carbide Olefins Co. Morgan joined Union Carbide Chemicals Co. in 1939 as a sales engineer working on actuated carbon solvent recovery systems and later was sales manager of activated carbon. He was transferred to Union Carbide Olefins as a product manager when the company was formed in 1958.

E. W. Turnquist appointed v.p.

. . . in charge of engineering for Braden Winch, division of Nautec Corp. He will be responsible for the company's winch design and new product development programs. Turnquist has been with Braden Winch for 27 years. Previously he was chief engineer of the Broken Arrow, Okla. firm.

Rector names 2 representatives . . . in the persons of E. C. Kopp and Welton R. Baxter. Kopp, a veteran of more than 30 years in the oil fields, joined Rector Well Equipment Co. as sales and service representative, working out of the company's home office in Fort Worth. He was formerly vice president and division manager of Maloney Crawford Tank Co. Baxter will work out of the Wichita Falls office as field and sales representative. Prior to joining Rector, Baxter was service engineer for Dowell, Mud Control Labs. and Advanced Oil Tools.

SEISMIC-DATA-HANDLING system produced by Electrodynamic Instrument Corp., is being examined by J. C. Stilley, manager of EIC's new Process Automation Division. The division will furnish a variety of services, including economic feasibility studies, engineering analyses of process-control requirements, evaluations of systems proposals, liaison engineering during system installation, evaluations of over all system operations, and other technical services related to process automation problems.

GULFPORT BUILT . . .

Tug ZEUS, 103' x 25' x 13'—1200 HP General Motors Diesel Gear Drive tug, built for intra-coastal Towing and Transportation Corp., Houston, Texas. Delivered August 13, 1957.

Gulfport Shipbuilding Corporation builds many types of fine marine equipment for the oil industry . . . derrick barges, tugs, dredges, cargo barges, drilling platforms, seismic vessels, crew and cargo boats, and fast, rugged cruisers for the inshore oilfields . . . Whatever your problem, you are in capable hands at Gulfport.

BUILDERS AND DESIGNERS

All-Welded Steel Tugs, Barges, Vessels

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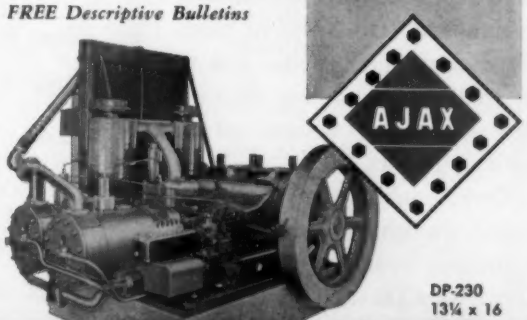
AJAX MEANS ECONOMY

- Trustworthy
- Long Life
- Minimum Maintenance
- Simple design
- Backed by 83 years of Craftsmanship Experience

WISE EQUIPMENT INVESTMENTS TODAY MEAN INCREASED PROFITS TOMORROW

FREE Descriptive Bulletins



DP-230
13¼ x 16

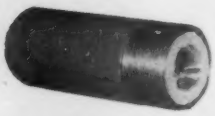
AJAX ENGINES

AJAX IRON WORKS CORRY, PENNSYLVANIA

Oil Field Distributors

- The National Supply Co. — Pittsburgh, Pennsylvania
- Bethlehem Steel Co. — Supply Division, Tulsa, Oklahoma
- Mid-Continent Supply Co. — Fort Worth, Texas

production and maintenance problems solved with Inhibited Acid



BEFORE CLEANING

AFTER CLEANING

Dowell inhibited hydrochloric acid is an efficient, economical solvent and cleaning solution. It is low in cost when its cleaning capacity is considered. One hundred gallons of 15 per cent hydrochloric acid will dissolve up to 184 pounds (one cubic foot) of pure limestone or calcium carbonate. It is ideally-suited to do-it-yourself operations.

Dowell hydrochloric acid has many uses. Some of them are: to improve production from old dolomitic or limestone wells; to remove scale and "gyp" from the face of producing formations, tubing and lead lines; to clean disposal or input wells; and to descale engine cooling systems, heat exchangers, boilers, valves, fittings, nipples, etc.

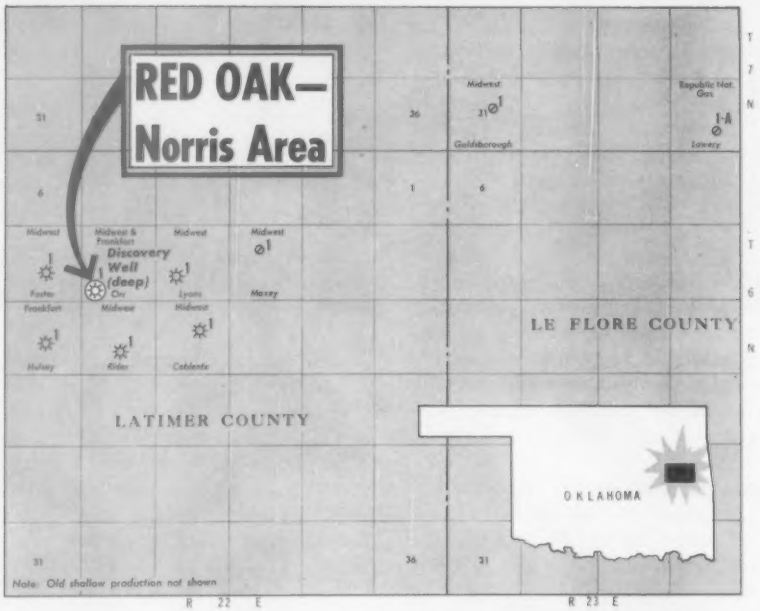
Dowell inhibited hydrochloric acid is available in small or large quantities from any Dowell station. Ask a Dowell representative for application information.

PRODUCTS FOR THE OIL INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

▶▶▶ Among the Drilling Contractors



DATA ON
ACTIVE FIELDS

Red Oak-Norris field, Oklahoma

1. Approved field name: Red Oak-Norris field. The old gas production was initially called Red Oak field and Norris field. The recent deep production on the Brazil anticline encompasses both older fields. Location: On the south flank of Arkoma basin in Latimer and LeFlore counties, Oklahoma.

2. Discovery well: Red Oak (shallow, Hartshorne sand) was discovered in 1912; Norris (shallow) was opened in 1932. The new Norris deep gas pay was opened in May 1959 by Midwest Oil and Frankfort Oil 1 Orr, S½ SW 8-6n-22e, Latimer County, Oklahoma. IPF was 11.7 M.M.c.f.d. from Atoka-Red Oak sand at 7,193-7,330 ft. IPF was 17.8 M.M.c.f.d. from Atoka-Spiro sand at 11,514-68 ft.

3. Trend of development: East-west.

4. Number of producing wells: Five (deep).

5. Spacing pattern: 640 acres.

6. Proved acreage: Approximately 3,000 acres. Up to 15,000 acres may be possible.

7. Principal operators in area: Midwest Oil Corp., Frankfort Oil Co., LeFlore County Gas & Electric Co., Republic Natural Gas Co., and Pan American Petroleum Corp.

8. Present allowable: Deep field is currently shut in. Shallow produced by LeFlore County Gas & Electric Co.

9. Number of active rigs: Four.

10. Casing program: 16-in. at 221 ft., 10¾-in. set at 2,084 ft., 7-in. set at 7,499 ft., 5-in. liner set at 12,451 ft.

11. Average drilling time per well: Varies with degree of drilling problems encountered. Wells will average 5-6 months.

12. Types of drilling fluid: Some wells are air-drilled below surface to 7,000 ft. Then these are completed with mud drilling.

13. Completion methods: Perforate casing, acidizing, and fracture treatment.

14. Types, sizes, and number of bits: Varies greatly due to mud and air drilling, primarily hard-rock types.

15. Special drilling problems: Very hard drilling, some lost-circulation zones, caving shales main problem, stuck drill pipe, and sands are difficult to anticipate. Some of the gas reservoirs are high pressure and blowouts are a threat.

16. Producing formations and depths: Geology: Atoka-Red Oak sand 6,800 to 7,600 ft. Atoka-Spiro sand 11,200 to 12,000 ft.

Be sure to see
our family portrait on page 73

17. Reservoir characteristics: Type drive: Solution gas. Gas-oil ratio: No oil. Oil-water contact: None. Gas water contact: Unknown. Only the Midwest 1 Rider encountered water in the Spiro sand. Source unknown.

18. Geologic markers: (Midwest Oil Corp. 1 Goldborough) Booch 905 ft.; Hartshorne 1,877 ft.; Top Atoka 2,122 ft.; Red Oak sand 6,983 ft.; Spiro sand 11,224 ft.; Wapanucka lime 11,378 ft.; Base Atoka 11,441 ft.; Cromwell sand 11,790 ft.; and Pitkin lime 12,437 ft.

19. Type trap: Structural anticline plunging to the west with some thrust faulting which occurs below the top of the Atoka 600-700 surface closure. The structural feature is the Brazil anticline.

20. Core data: Porosity: Red Oak: ±14. Permeability 0.1-5.0 md. Resid. Oil saturation none. Total water saturation 16-21. Spiro: Porosity 10-15%. Permeability 0.2-1.3. Resid. oil saturation none. Total water saturation 16-20%.

21. Estimated recovery: Unknown at present.

22. Pressures: Flowing tubing 905-3,000 psi. Shut-in casing 1,278-2,760 psi.

23. Tests and logging procedures: I-Es., Sonic, Dipmeter, Caliper. I-Es. 200 ft. to total depth. Drillstem test drilling breaks. Cores from 7,000 ft. to 7,200 ft. (Red Oak sand).

24. Pipeline outlets: Shallow-Le-Flore County Gas & Electric Co. Deep none.

25. Exploration methods before discovery: Seismic, surface geology, subsurface geology.

26. Average costs: Dry hole $257,400, Producing well $335,800. Average total depth 12,500 ft. Footage rate: No footage rates—all drilling is on day work. Day rate $925 without pipe to $1,050 with drill pipe.

27. Gas analysis:

	Spiro		Red Oak
CH_4	99.67		96.68
C_2H_6	0.02		1.75
C_3H_8	0.02		0.24
$C_4H_{10}\pm$	0.03		0.11
B.t.u. per cu. ft. N.H.V.	994		1017
Gal. C_3H_8 and heavier, per M.c.f.	None	CO_2	1.09
Nitrogen Mol, vol. %	0.26		0.10
Specific gravity	....		0.577

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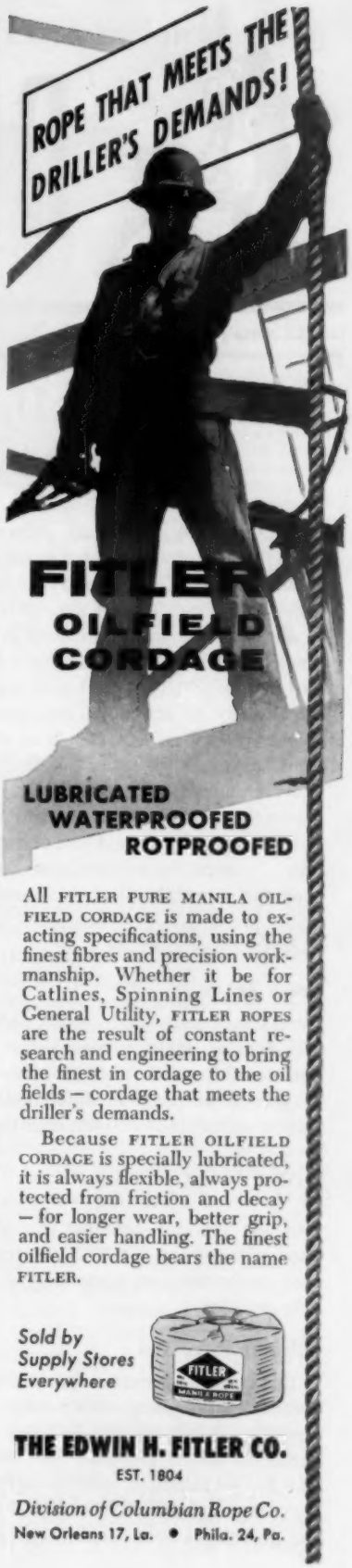

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DRILLING BRIEFS

DRILLING MUD DATA — REPORT 61-1

Increased Drilling Efficiency with SOLTEX* is verified by Field Use

Our completely new and different mud additive, SOLTEX, has now been on the market for over a year. In this time, we've received hundreds of reports on regular field use. The results, we're happy to say, are similar to those we experienced in our own development field tests. Treatments have been running from 2 to 6 lbs of SOLTEX per bbl of mud, depending upon the severity of actual or anticipated problems. The primary benefit of SOLTEX is to stabilize hole conditions, particularly where swelling and sloughing or heaving shales are encountered. In addition, it has been shown that SOLTEX stabilizes and improves down-hole flow properties and fluid loss control . . . reduces friction . . . improves oil emulsions . . . and reduces the need for other chemical treatment. Moreover, geologists prefer SOLTEX because it does not affect the fluorescence of cuttings.

South Texas

Here, the operator added 6 lbs of SOLTEX per bbl to a 17.4 lbs/gal inhibited mud before drilling into a section noted for such troubles as sloughing shale, pipe drag, high torque, and differential pressure sticking. Casing was set at 11,466 feet near the top of the trouble zone.

After adding SOLTEX, the well was completed to 12,250 feet in record time. From past experience in the area, the operator feels that this could not have been done without the SOLTEX treatment that improved mud properties and completely eliminated the usual hole troubles.

Offshore Louisiana

In this case, the operator was in trouble at 10,200 feet because of sloughing, sticky shale, hole bridging and pipe drag. Six lbs of SOLTEX per bbl and 1½ lbs of Technical Grade Driscose* per bbl were added to a 12.8 lbs/gal inhibited mud. Sloughing was eliminated, pipe drag was reduced from 50,000 lbs to 10-15,000 lbs, and no bridges were encountered when drilling to TD at 11,850 feet. The well was logged, casing run and cemented without difficulty.

California

This well had been sidetracked at 10,000 feet and the hole was deviated 23°. Hole conditions had become progressively worse, making it necessary to drill in and out of the hole. Approximately 2½ lbs of SOLTEX per bbl were added to the sodium base mud. Hole conditions improved and drilling continued with no further trouble encountered.

Oklahoma

At 13,784 feet, 2 lbs of SOLTEX per bbl were added to a 12.8 lbs/gal mud to help stabilize hole conditions. Torque was reduced 50% after the first circulation. Flow properties of the mud improved, pump pressure decreased, and penetration rate improved.

South Louisiana

The operator on this well credits SOLTEX for saving the hole. Sloughing shale was encountered below 11,000 feet. Unable to run logs, the section was reamed twice before tools could be run to bottom. After logging, the hole caved in. Five lbs of SOLTEX per bbl were added over one circulation. The service engineer reported that within three hours the hole was clear. Drilling was resumed and continued to total depth with no further trouble encountered.

• • •

If you are interested in more complete information on SOLTEX . . . contact your mud dealer or Drilling Specialties Company representative.

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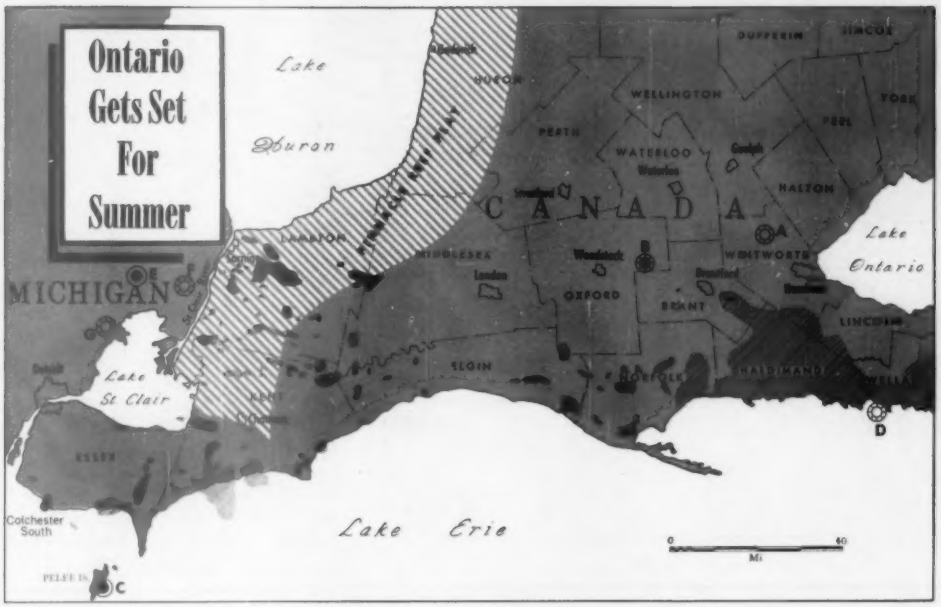


ONTARIO, with four discoveries to its credit in 1960 (A, B, C, and D), expects to do better this year, as the pinnacle-reef hunt gets under way east of the St. Clair River and along the shores of Lake Huron. Hopes for success are based on strikes made in Michigan last year (E, F, and G), all in Silurian pinnacles.

Canadians hunt for miniature reefs

BY FRANK J. GARDNER

ONE OF THE busiest Canadian drilling and leasing spots this summer is the oldest oil region in North America. Southwestern Ontario, 104 years after J. M. Williams discovered oil at Oil Springs in Lambton County, is in for a real wildcat binge. And target No. 1 is the pinnacle reef of Silurian (Guelph-Lockport) age.

Many wildcats coming . . . These tiny reefs, averaging less than ¾ section in basal area, have intrigued eastern Canada operators for the past decade. As far back as 1889, they attracted wildcatters' attention, and by 1951, 15 of them had been drilled; 9 paid off with oil or gas. Between 1951 and 1955, tests were sunk on 24 newly found reefs; of these, 10 produced gas, 2 produced oil, and 12 were dry. Since 1955, gravity surveys have discovered an unknown number of new pinnacles and for the next year or so, many rigs will dot the western Ontario scene.

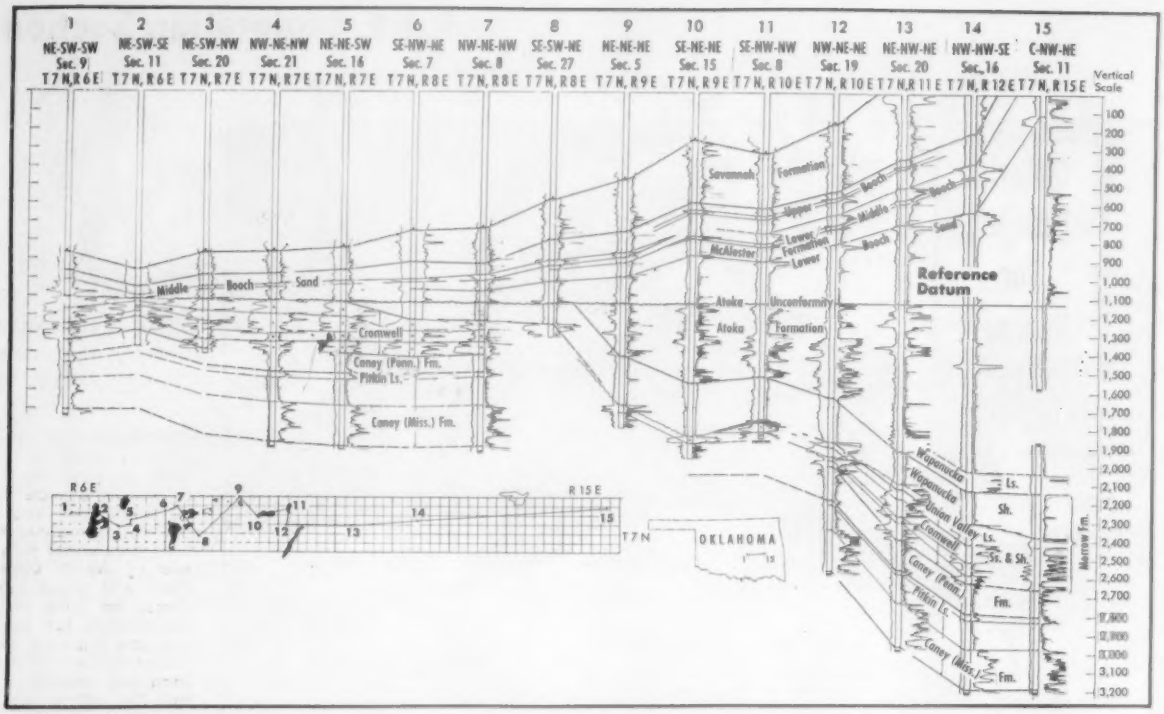
Some stimulus for the current play came from successes across the St. Clair River, where last year, three pinnacle reefs paid off in St. Clair and Macomb counties, Michigan. One produced 234 bbl. of 42.8° oil per day, while two were gas strikes with potentials of 2,800 M.c.f. and 20,000 M.c.f. per day.

In Southeastern Michigan basin . . . The shaded area on the map is one of most intense interest at the moment in Ontario. Here, along the shores of Lake Huron and Lake St. Clair, drillers hope to find oil or gas at depths of 1,500 to 1,800 ft. in the Silurian reefs. The prospects lie on the southeasternmost rim of the Michigan basin on the northwest flank of the Cincinnati arch (Algonquin arch in Ontario).

The gravity meter has been unusually successful in spotting these small reef buildups, and so far is the prime exploration tool in the search. But just hitting one doesn't necessarily spell successful production. For some of the reefs have been found to be devoid of effective porosity; the porosity was there, but it's plugged with salt or anhydrite. The same situation has been found in the Michigan reefs.

Nevertheless, Ontario operators are girding for the summer search. One of the largest blocks yet assembled is 130,000 acres held by United Reef Petroleum, Ltd.; it lies in Lambton, Middlesex, and Huron counties. United plans to drill 10 exploratory wells on its block before the year is out, most of them to the 1,800-ft. level. Other operators actively in the play are Imperial Oil Ltd., Anchor Petroleum Co., Calvert Drilling Co., Colonial Petroleums, and Union Gas Co. of Canada.

It will be an interesting campaign to watch, as the bit is aimed at these miniature Leducs, whose average width is 3,800 ft., length 6,000 ft., and height 400 ft. But each one is worth about half a million barrels of oil or 20,000 M.M.c.f. of gas.



FIRST STEP in understanding the stratigraphic conditions of an area is to make a regional electric-log profile. This will help explain some of the depositional factors and indicate the over-all lithological aspects. Fig. 1.

Make the most of those **electrical logs** if you want to find strat traps

The author . . .

BY DANIEL A. BUSCH

. . . is a consulting geologist, Tulsa. He received his BS in chemistry from Capital University, and his MA and PhD geology degrees from Ohio State University.

Dr. Busch is widely known in the geological profession. His experience includes 5 years as teacher of geology at the University of Pittsburgh, a year with the Pennsylvania Geological Survey, 6 years with Carter Oil Co., and 2 years with Zephyr Drilling Co.; he has been a consultant since 1954. In 1959, he won the AAPG's Matson Award for best presentation of a paper at the Dallas national meeting; it was entitled "Prospecting for Stratigraphic Traps".

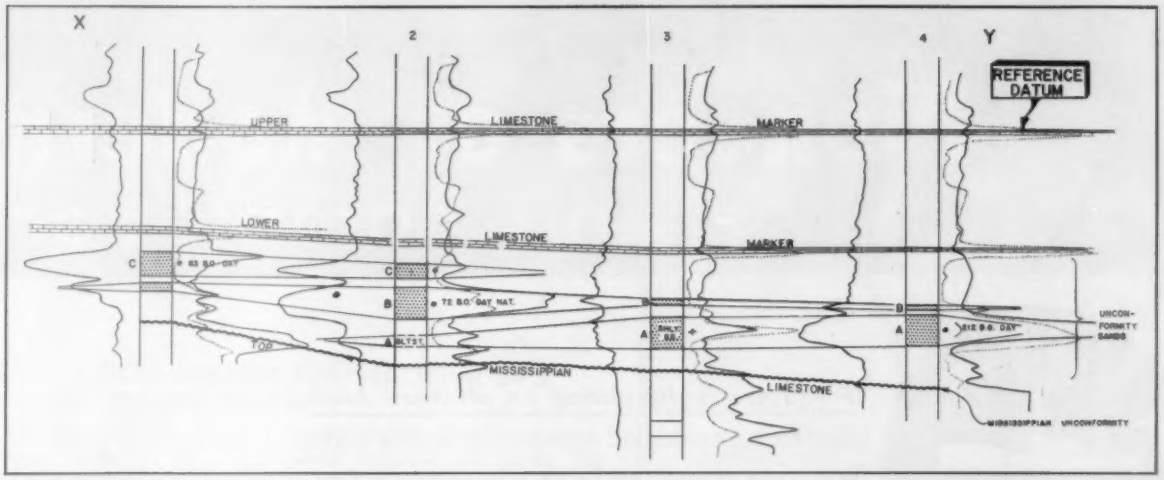
IT IS SURPRISING and at the same time lamentable, that in these days of economic stress in the oil business, some operators are "economizing" by failing to run electrical logs (or the more modern combination electrical - induction logs) on their wells.

In the Appalachian basin, for example, the principal type of subsurface information available to the geologist and petroleum engineer is primarily sample and drillers' logs. These two are indispensable and yet at the same time they are inadequate to uncover the vast amount of reserves yet to be found in this basin.

Very precise correlations of many subsurface formations are now possible and geological phenomena such as unconformities and facies changes usually can be readily recognized from them.

Electrical logs are proving to be indispensable in defining stratigraphic trap prospects. In this type reservoir, a detailed knowledge of the paleogeographic environment of deposition is essential. Electrical logs afford the necessary markers for identifying and analyzing genetic sequences which, in turn, are necessary to the reconstruction of the surface of deposition of reservoir sands.

A new science of well-log analysis has come into being. In much of the Gulf Coast area, for example, it is common practice to drill a well to target depth, without collecting samples, and side-wall cores and wire-line test only those formations which appear attractive solely on



SECOND STEP. After regional deposition is plotted in section of interest, find the local stratigraphic relationships that account for production. A detailed log profile in a nearby field is essential. Fig. 2.

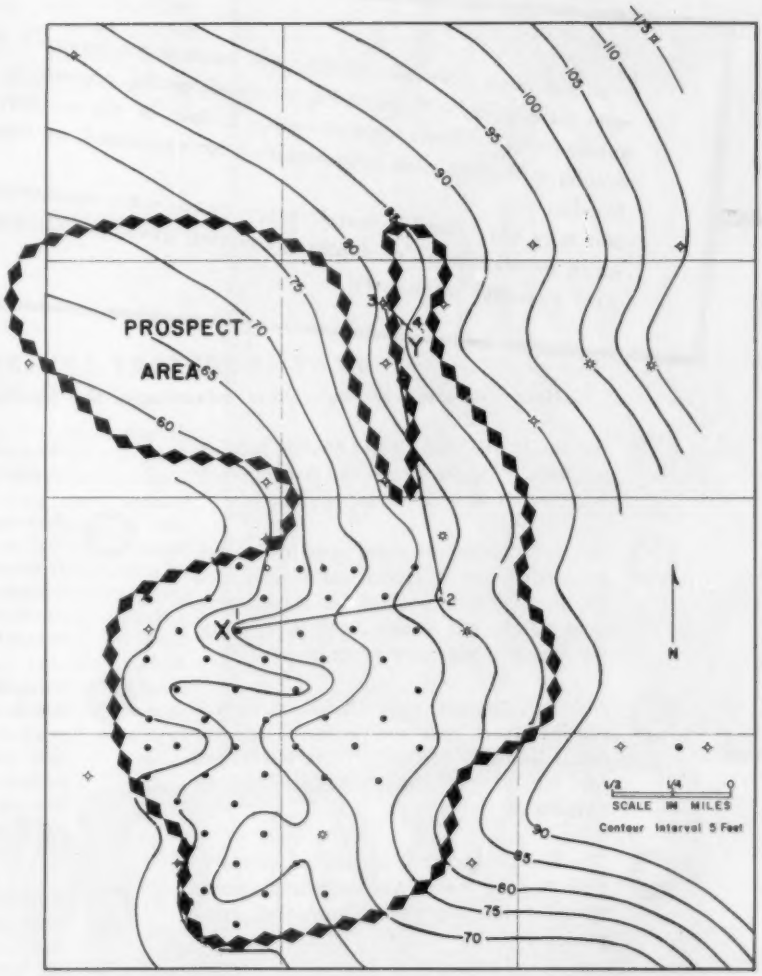
the basis of detailed well log analysis.

Before the advent of electrical logs, the exploration geologist used both surface mapping techniques and sample studies of drill cuttings as primary methods of delineating structures and trends conducive to oil and gas accumulation. The reserves discovered by these techniques were remarkably large. The emphasis, however, was primarily up delineating structure.

Geophysical techniques, as applied to oil and gas exploration, came into their own at about the same time as electrical and radioactive logging methods achieved widespread acceptance. Geophysical methods, however, have been largely limited to defining structures. Gradually, surface structure mapping gave way to subsurface structure mapping by the geophysicist. Both techniques afforded the basis, or excuse, for the drilling of numerous wildcat wells—many of which proved to be dry. In some instances, production was obtained in spite of, and not because of, the apparent structural reason for drilling.

As logging techniques have gained widespread acceptance by industry in the past 20 years, an entirely new combination of parameters has become available. Logs are serving as a basis not only for structural mapping but, increasingly more important, as an essential means of extending the limits of old pools and predicting new pools where stratigraphic conditions are the primary consideration.

The geologist trained in the basic



THIRD STEP is an isopachous map which will help pinpoint the areal distribution of economic reservoirs. Interval mapped in this example is from upper limestone marker (see Fig. 2) to Mississippian unconformity. Fig. 3.

An important message from

Pioneers of Modern and completion

IF you are contemplating an off-shore development program, let Shaffer's unequalled experience in this highly complex field save you time, money and costly headaches. Outlined below are facts you may not have known about sub-sea methods and equipment.

For well over a decade, Shaffer has been at the forefront of sub-sea drilling and development techniques, with particular emphasis on the economical and versatile "floating-vessel" approach to off-shore development. In fact, in the majority of successful "floating-vessel" drilling and production programs thus far completed, an important role has been played by Shaffer!

Not only are "floating-vessel" methods far more economical, but they also can be used at a much greater range of depths, permitting development of extensive sub-sea areas not practical by other techniques.

MANY IMPORTANT ADVANTAGES

Here are some of the unique advantages the Shaffer off-shore system offers:

1. All equipment used in the Shaffer Sub-Sea program is simple to use and is completely field-proven in under-water operations!

2. The entire program, from spud-in through production, can be carried out without need for divers. This is not only advantageous in deep waters, but at *any* depth saves costly rig time and simplifies procedures!

3. Although operations are carried on from a floating vessel, they are similar to conventional land-type methods. There is no need for highly specialized operations to be developed!

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8. All Shaffer Sub-Sea Equipment is furnished with packing elements developed *and proven dependable* on successful sub-sea operations. *All permanent sealing elements in the production hook-up are backed up by secondary seals!*

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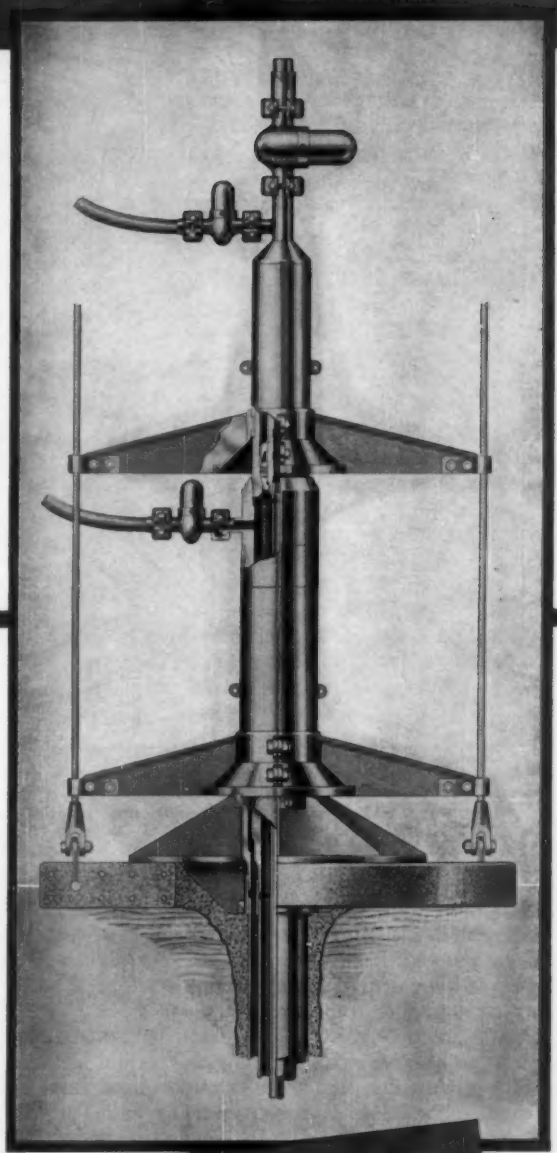
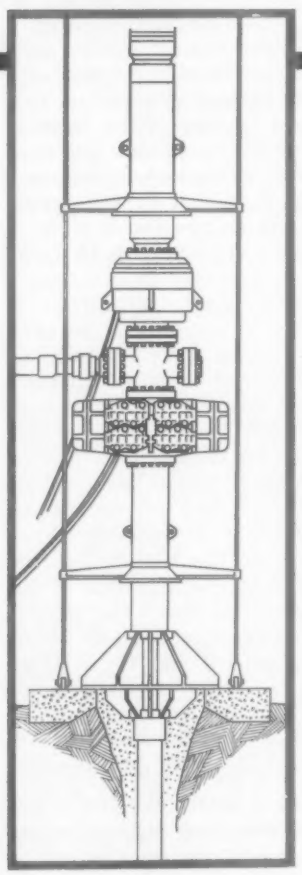
TYPICAL SHAFFER SUB-SEA HOOK-UPS

■ Illustrated at right is a typical Shaffer Sub-Sea Production Hook-Up. This equipment requires no divers for hook-ups, control or other operations, and permits sub-sea oilwells to be developed and produced from many miles offshore, if desired—and from depths beyond the range of conventional diving equipment.

■ Illustrated below at left is a typical Shaffer Sub-Sea Drilling Hook-Up. With this equipment, the entire drilling program can be carried out from either a floating vessel or a mobile-platform without need for divers at any stage of the operation.





WE REPEAT . . .

The first-hand experience of the Shaffer organization in providing successful off-shore development equipment — both in domestic and overseas areas — can prove invaluable in saving time, simplifying operations and insuring optimum returns on your particular sub-sea operations. May we place these years of successful experience and "know-how" at your service?

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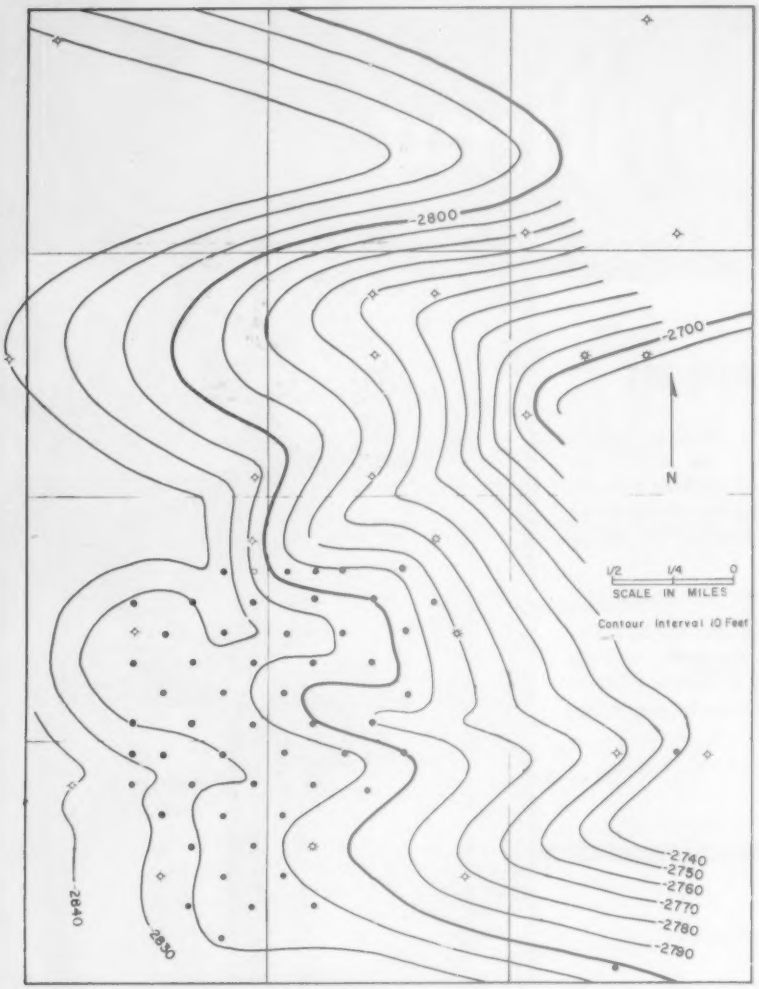

FINALLY, structural considerations, even in a strat trap, may have an effect on factors necessary for accumulation. In this case, a prominent irregular west-plunging nose, eastward sand wedgeout, and position of the oil-water contact (—2,835 ft. in C bed) all play roles in oil existing in the field. Fig. 4.

principles of sedimentation and stratigraphy now has the necessary tools for determining the nature of ancient depositional environments, information essential to prospecting for stratigraphic traps. Such tools include not only conventional electrical but also radioactivity, acoustical, and induction logs. A judicious use of combinations of these permits the reconstruction of depositional topography. The relationship of individual bodies of sand to this ancient topography in many instances serves to identify the type of sand accumulation, i.e., beach, bar, channel, strike valley, sheet, etc.

The following discussion will point up some geological applications which can be made by the geologist in:

- Establishing detailed subsurface correlations where sample studies alone would be inadequate.
- Analyzing the geological control on a stratigraphic trap and using it as a basis for predicting a new pool.
- Analyzing the porosity and fluid characteristics of a reservoir sand from electrical logs in reevaluating a "dry hole."

Correlations

No subsurface interpretation of bedded strata is any better than the the correlations on which it is based. Precise correlations, therefore, must be the starting point of any exploratory effort. Fig. 1 is a west-east electrical-log profile of the lower Pennsylvanian strata of the Greater Seminole district of eastern Oklahoma. It crosses a classic area in the historical development of geology as a practical tool applied to oil.

Before the advent of electrical logs, in 1930, it was proposed by A. I. Levorsen[1] that in this area the rate of divergence of the subsurface formations to the east is sufficiently great to offset the western regional dips of the surface beds, "the result being that the base of the Pennsylvanian is much nearer the same level in all parts of the (Seminole) county that would be expected." Although this significant pronouncement was based on thickness comparisons of sample logs, it remained for electrical-log correlations to reveal just how correct and oversimplified this statement was.

Fig. 1 is not a structural profile but a stratigraphic correlation profile drawn with the Atoka unconformity as the reference datum. It clearly shows the eastward divergence of the Morrow, Atoka, McAlester, and Savannah formations, all lower Pennsylvanian in age. The lowermost member of the Morrow (the Cromwell) is divisible into four lithologic units arbitrarily referred to as A, B, C, and D. All four of these units are present in wells 3 through 5 and 12 through 14. Generally speaking, the D is the most widespread of the units. In areas other than that shown on the profile this unconformity is known to be great enough to cause Cromwell D to rest directly on the Mississippian Caney. The stratigraphic implications are obvious.

The Union Valley limestone, in wells 13, 14, and 15, thickens at the expense of the overlying Wapanucka shale; this is truly a facies change of the basal portion of the Wapanucka member. The normal 250-ft. thickness of shale is shown between wells 9 and 12. West of well 9, thinning is abrupt as a re-

"As logging techniques have gained widespread acceptance in the past 20 years, an entirely new combination of parameters has become available . . . logs are a basis in predicting new pools where stratigraphic conditions are the primary consideration."

"A judicious use of combinations of logs permits the reconstruction of depositional topography."

sult of the Atoka unconformity. West of well 6 the Wapanucka shale is wholly absent.

The two characteristic lithologies of the Atoka formation are clearly shown in Fig. 1. In wells 9 through 13 the shelf facies, consisting of a rapidly alternating series of sands and shales, is present. Basinward (to the east), in wells 14 and 15, the Atoka consists almost entirely of shale. An abrupt increase in the rate of thickening is coincident with the facies change. The manner in which the Atoka and older sediments are truncated by the Atoka unconformity can be best understood by use of an electric log profile such as this. Lithologic changes are not sufficient diagnostic, on the basis of sample cuttings alone, to clearly establish the position or magnitude of this unconformity.

There are thin limestone beds interrupting the McAlester shale and sand, several of which are correlated in Fig. 1. None of these can be consistently identified in well cuttings. The middle Booch sand is the principal producing member of this formation, especially where it thickens locally into a channel type sand (not shown on profile).

The Savannah formation is predominantly a shale with a multiplicity of thin but persistent beds of limestone in the lower half.

Stratigraphic Trap Analysis

Figs. 2, 3, and 4 illustrate a step-by-step method of outlining a stratigraphic trap prospect using electrical logs. Fig. 2 is a stratigraphic correlation profile (x-y) in an area of productive basal Pennsylvanian sands. The "upper limestone marker" is the reference datum. Production is from a series of three clearly distinguishable lenticular sandstones which rest uncomfortably on Mississippian erosion surface. These sandstone members are arbitrarily designated as A, B, and C from base upward and they exhibit an en echelon (shingled) arrangement with respect to each other. From regional paleogeographic studies, it is known that this series of sandstones was deposited along the western margin of an early Pennsylvanian marine embayment. The en echelon sandstones, which occupy stratigraphically higher positions from east to west, clearly indicate that the marine transgression was in a westward direction. The principal area of embayment lay to the east and the slope of the eroded Mississippian surface dipped eastward.

By judicious use of the electrical logs it is possible to determine the direction of dip, rate of dip, and trend of this depositional surface. By reconstructing the trend of the surface of deposition it is possible to predict where these lenticular sands are most likely to be developed.

Thin limestones, coal beds, bentonite, and silt streaks generally are deposited in positions essentially parallel to sea level. Such "markers" are seldom thick enough to be consistently identified from sample studies of rotar cuttings. Due to their widespread character they are good reference markers and may be readily noted and correlated from electrical logs.

The upper and lower limestone markers shown in Fig. 2 are only a few feet thick but can be readily identified in all of the logs shown in Figs. 3 and 4. The stratigraphic section between the Mississippian unconformity and the upper limestone marker is devoid of any disconformities or breaks in sedimentation. This, therefore, comprises a genetic sequence of sands, shales and limestones. An isopach map of this interval will show not only the approximate rate and direction of maximum slope of the depositional surface, but also the trend of the environment which was conducive to the deposition of the A, B, and C unconformity sands.

Such a map is shown in Fig. 3 with the position of cross-section x-y (Fig. 2) noted. The producing sands of the pool area (in the lower half of Fig. 3) were deposited where the genetic interval is less than 88 ft. thick. This interval extends from the pool area in a north-northwest direction. The eastern margin of production is defined by an abrupt eastward (basinward) shaleout of the A sand member.

A structure map of the producing formation would be misleading, inasmuch as production is from several lenticular sands which occupy seccessively lower stratigraphic positions from west to east (Fig. 2). The upper limestone marker however, being a true time horizon, is ideal for determining the structural configuration in the subject area.

Fig. 4 is a structural map of this upper limestone market and reveals a prominent, irregular, west-plunging structural nose over the pool. The western limit of the pool is structurally controlled by an oil-water contact in the C sandstone member. The position of this contact approximates 2,835 ft. on the upper limestone marker. Thus, this pool owes its existence to a combination of two factors: an eastward wedgeout of several en echelon, lenticular sandstone members, and a westward-plunging structural nose, which serves to localize the accumulation of hydrocarbons.

The prospect area, immediately north-northwest of the pool area (Fig.3) overlies a projection of the same depositional environment as the proved pool area and is limited on three sides by another west-plunging structural nose.

Thus, there is a duplication in the prospect area of the two critical factors that were necessary for oil accumulation in the area to the south. Sand member A is well developed in well 4 of Fig. 2. This well is offset by dry holes to the northwest and southwest where none of the three unconformity sands are well developed. A thin, shaly development of the B sand, however, may be noted in well 3 of Fig. 2. Since the majority of the wells in the pool area, to the south, produce from the B and C sands, it is logical to predict the maximum development of these two members in the prospect area just to the west of well 3.

Although this example of stratigraphic trap analysis is taken from Oklahoma, a similar approach is useful in prospecting for such pools elsewhere in the Mid-Continent area, Rocky Mountains, Illinois basin, etc.

References

1. Levorsen, A. I., Geology of Seminole County, Oklahoma, Oklahoma Geological Survey Bulletin 40, Oil and Gas in Oklahoma, Vol. 3, pp. 289-352, 1930.

2. Busch, D. A., "Deltas Significant in Subsurface Exploration," World Oil, 139, No. 7, pp. 95-98 and 106, 1954, and 140, No 1, pp. 82-86, 1955.

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positioning on casing. Fingers fold upward to avoid wall damage while running casing, and during reciprocation they turn down causing the two inner prongs to clean the bore hole.

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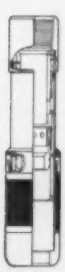

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Exploration outlook

San Juan drillers tap Pennsy pay with new discovery

SAN JUAN PENNSYLVANIAN FIELDS

	Year disc.	Pay depth	No. of wells	Cum. prod. 1-1-60
1. Barker Creek Paradox	1945	Paradox 8,840	9 gas	95,188 M.M.c.f.
2. Bluehill Paradox	1953	Paradox 7,040	1 gas	132 M.M.c.f.
3. Chimney Rock	1953	Paradox 7,604	1 shut in gas	
4. Four Corners Paradox-Penn.	1956	U. Hermosa 5,608	1 oil	55,000 bbl.
5. Hogback Penn.	1954	Penn. 6,166	2 oil	197,000 bbl.
6. Rattlesnake Penn.	1929	Hermosa 6,585		490,000 bbl.
7. Ute Dome Paradox	1948	Paradox 7,300	2 shut in gas	

LONG-MISSING Pennsylvanian production has returned to the big San Juan basin of Northwest New Mexico—a basin almost totally productive in Cretaceous rocks. Continental Oil Co. completed 3-18 Table Mesa in C SE NW 3-27n-17w, San Juan County, flowing 21,500 M.c.f.d. plus 15.5 bbl. of condensate per million. Production is from perforations in the lower Barker Creek zone of the Pennsylvanian Paradox at 7,097-7,113 ft. The gas is 5.4% helium.

Only seven Penn fields

. . . have ever been tapped in the San Juan basin. None of the fields has amounted to too much, Rattlesnake Penn being the biggest and oldest. With the advent of the large and prolific Cretaceous gas and oil fields in San Juan, Pennsylvanian exploration slipped by the wayside. Even though the Paradox basin Pennsylvanian boom has been going on for several years, explorers never thought much about the Pennsylvanian in Northwest New Mexico.

CHA CHA GALLUP CRETACEOUS FIELD is one of the most active new producing areas in the Four Corners country. (Photo courtesy Pan American Petroleum Corp.)

All existing Pennsylvanian fields in San Juan basin lie on the northwest side of the gas bowl. Pennsylvanian rocks are thin or missing along the north and northeast edges of the basin along the border of the Uncompaghre-Sangre de Cristo land mass and also along the south side bordering the Defiance-Zuni uplift . . . both of which existed in Pennsylvanian time. Pennsylvanian rocks where present in the basin are from 2,000-5,000 ft. thick.

The second try at Table Mesa

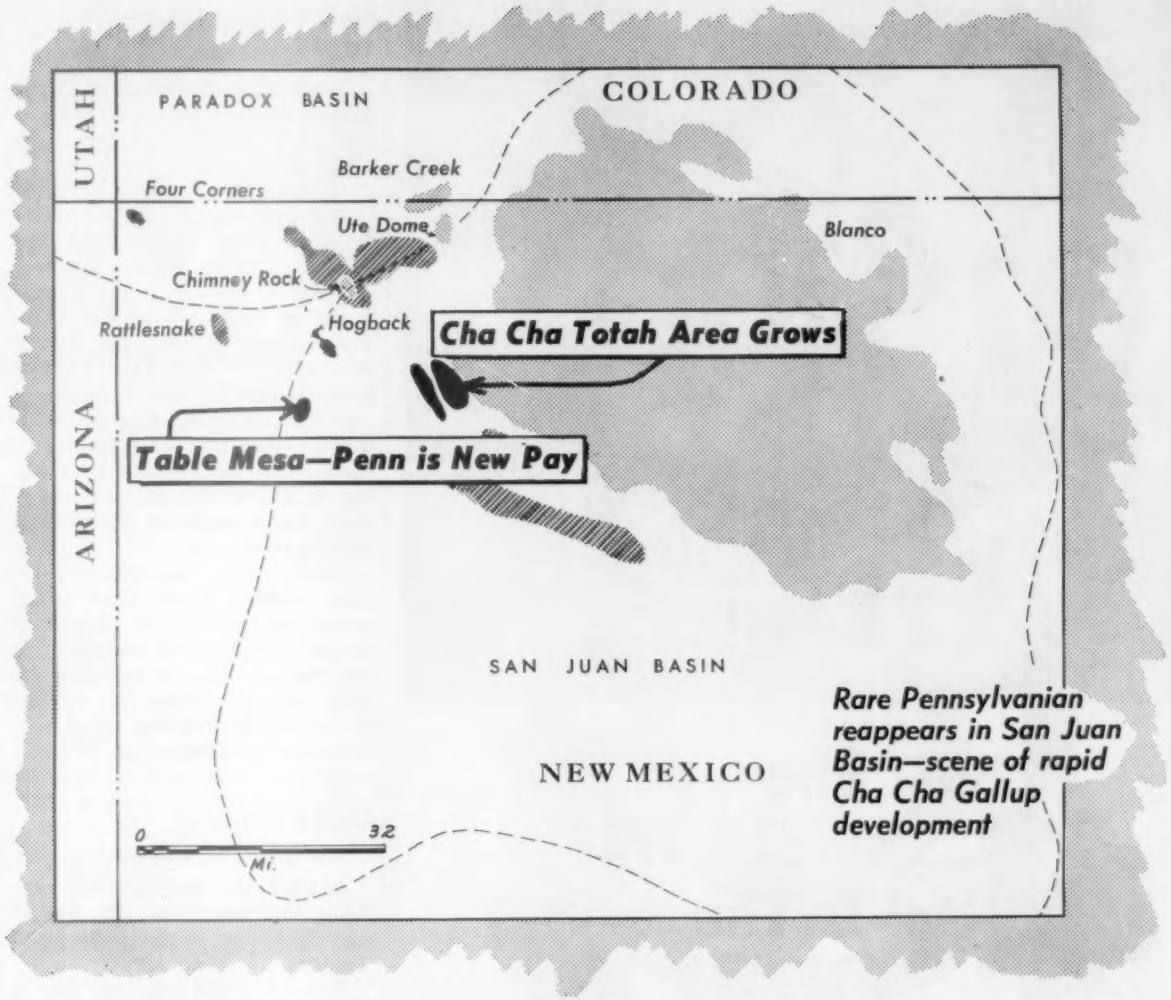
. . . should be of notice to San Juan oil-hunters. Mesa found oil in the Mississippian. That well made 21,688 bbl. before going to water. They tried to complete that well in two Pennsylvanian zones unsuccessfully.

There were only two wildcats drilled in the entire basin last year into Pennsylvanian rocks. Amerada Petroleum Corp. drilled 1 Navajo-10 in San Juan County to 6,960 ft., finding the Hermosa at 5,268, Paradox at 5,901 ft., and the Molas at 6,743 ft. Texas Pacific Coal & Oil Co. drilled 1-B Navajo in San Juan County to 9,336 ft., finding the Hermosa at 6,800 ft., Ismay at 7,796 ft., and Barker Creek at 8,300 ft. A test got only 300 M.c.f.d. from Barker Creek zone.

It will take more than two wildcats to find any Pennsylvanian production. True, the Pennsylvanian is not too widespread in the basin, being confined to the west and northwest sides, but it has been the Main pay in the field since 1925 has been the Dakota Cretaceous. In 1955 Continental 17 Table second-biggest producer in the basin—a far-away second to the booming Cretaceous.

Cretaceous rocks still reign

. . . in San Juan basin. The current Cretaceous success title-holder is the Cha Cha trend in San Juan County. Since late last year the Totah-Cha Cha area has held the drilling spotlight in the southern Rockies in a firm grasp. The two pools lie along parallel northwest-to-southeast trends about halfway between Horseshoe Canyon on the north and Angels Peak-West Angels Peak trends on the southeast. Though



THERE'S NEW EVIDENCE of Pennsylvanian production in the San Juan basin, one of the world's largest Cretaceous producing areas.

the fields are almost connected, they are still believed to be separate areas.

The Cha Cha trend really began in 1958 at a Pan American Petroleum Corp. wildcat, 1 USA-Holder in SE SE 21-28n-13w. This 95-bbl. per day well from Gallup at 5,508-5,685 ft. didn't cause much of a flurry. More than a year later the real Cha Cha discovery was drilled. That was Benson-Montin-Greer 2 Jones in NW SE 17-28n-13w, 2 miles northwest of the Holder well. This one flowed 132 bbl. per day, causing a five-well development program to begin. Others moved in and development began to flourish.

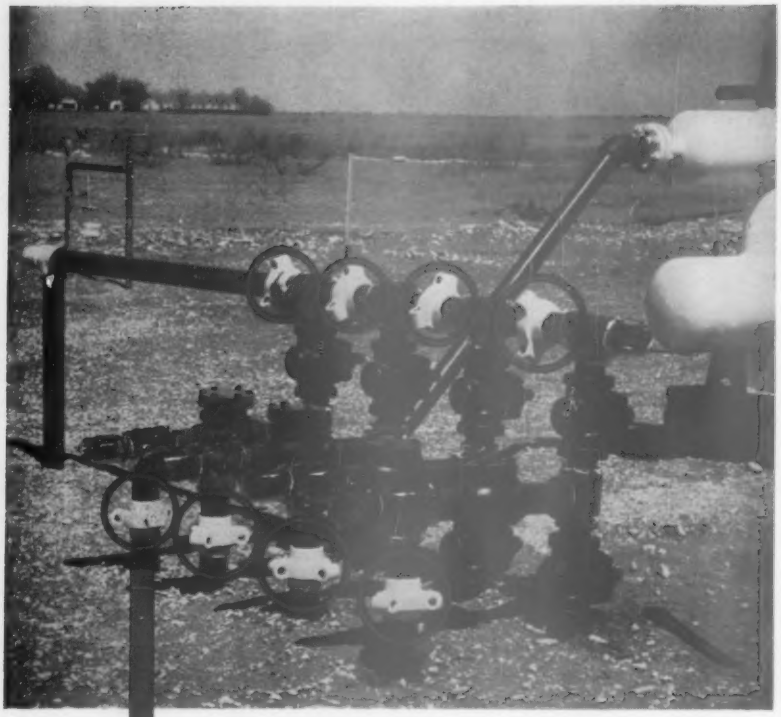
El Paso Natural Gas Co. spudded a Dakota test 4 miles to the northwest of the above work at 1 Ojo Amarillo in NE NE 27-29n-14w. Finding the Dakota dry, El Paso went back to the Gallup at 5,322-44 ft., getting 304 bbl. per day. Others moved in here and the Ojo area fast merged into Cha Cha.

The northern or Ojo part of Cha Cha is more or less separated from the southern or Cha Cha part by a thinning sand gap. Production should be established in this thin sand section, however, filling the gap and making a trend of more than 10 miles in length. Limits haven't been defined at either end of the trend as yet.

The Totah discovery was a 1959 find by Tenneco Oil Co. at 8 Glenn Callow in SW SE 27-29n-13w. It flowed 514 bbl. per day from perforations at 5,185-5,247 ft. There is also Dakota gas in the Totah pool, several wells with dual completions. The field is growing at both northwest and southeast ends, paralleling Cha Cha. Tenneco Oil Co. and Aztec are the big developers at Totah.

Both Totah and Cha Cha produce from lenticular Gallup formation sands. The lower of the two sands in the area is present in the center and southeast part of Cha Cha, but generally is absent at Totah. The upper sand is about 20 ft. thick, while the lower is 15 ft. thick. Porosity ranges from 12-16% and permeability up to 300 md. Estimated recoverable reserves are 91 bbl. per acre-ft. The spacing pattern is 160 acres. Average cost for a well completion is $57,000. Unit allowable for Cha Cha is 164 bbl. per day per well. Daily average output in March was 6,500 bbl. Totah's top unit allowable is 94 bbl., or field allowable of 1,700 bbl. daily.

—John C. McCaslin



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New Indiana field has 19 oil producers

A new field discovered in southwestern Indiana last year, 6 miles west of Evansville, now boasts 19 oil producers and 2 dry holes.

Mayhew Oil Co. Inc. has nine Waltersburg and two Biehl producers in the Posey County field. Initials range up to 140 bbl. per day. The second Biehl well in the area, 3 George Hast, SW SE SW 2-7s-12w, pumped 45 bbl. per day in Biehl at 1,507-26 ft. There are two locations staked.

Eakle and Holder have five Waltersburg and one Tar Springs producers in the field with initials ranging up to 260 bbl. per day, and a dual Tar Springs and Waltersburg well on production.

Ralph Wilson has one Waltersburg producer in the field. Initial on this one was 25 bbl. of oil and 22 bbl. water per day, natural. Walton Drilling Co. stepped out ½ mile from production at 1 Orth-Mohr unit in SW NE SW 11-7s-12w, and is drilling.

Ohio's Richland adds good producer

In Ohio, the fourth and best producer has been finaled in the oil play developing in central Richland Township, Fairfield County.

Edward Kubat reported the 2 Robert P. Bope, Section 6, flowed 200 bbl. of oil in a 7-hour test after fracture. Gas flow was estimated as 2 M.M.c.f.d. The Clinton sand was logged at 2,511-37 ft. and had 20 bbl. with 100 M.c.f.d. natural.

• In Canaan Township, Morrow County, United Prod. Co. are rigging up for a second test on the O. & E. Myers tract, Section 33. The 1 hole is "tight," however; total depth was reported to be 3,200 ft. for this remote wildcat.

New Mexico field confirmed in Lea County

The east offset to 1 Lion-State, Pennsylvanian discovery in northwest Lea County, Southeast New Mexico, was completed flowing 149 bbl. of oil plus 32 bbl. water in 12½ hours through ¾-in. choke. The well is James G. Brown & Associates 1-G State, 9-14s-33e. Location is 20 miles southeast of Cap-

rock and 2 miles northwest of Saunders field.

Eddy County. Sinclair completed 77-B Turner in eastern Eddy County, 9 miles southwest of Maljamar, flowing 215 bbl. of 41.7°-gravity oil in 10 hours through 24/64-in. choke. Production is from Atoka Pennsylvanian at 10,919-27 ft. Location is in 30-17s-31e, surrounded by Grayburg-Jackson shallow production.

Oil and gas field atlas available from Pennsylvania

An oil and gas field atlas of the Foxburg Quadrangle in Pennsylvania is available from the Department of Internal Affairs, Topographic and Geologic Survey, Harrisburg. Nine maps of the Foxburg Quadrangle have been prepared on a scale of 1 in. to 2,000 ft. to show the oil and gas areas of the region and the location of the wells drilled. A structure map has also been drawn to show the structure on the top of the Venango First sand by means of 25-ft. contours. With increasing interest in Pennsylvania development, this atlas will be a handy and valuable addition to map libraries.

Silver Creek extension completed in Nebraska

Texaco Inc. completed 7 Harsch in NW NW 18-2n-26w, Red Willow County, Nebraska, pumping 208 bbl. of oil per day, cut 1% basic sediment and acid water.

The extension well is producing from Lansing-Kansas City Pennsylvanian perforations at 3,246-57 ft. and 3,264-68 ft. Location is ¼ mile north of other field production.

Half a dozen fields get names in Nebraska

The Nebraska oil and gas conservation commission named six discoveries in the state. The new fields are in Dundy, Frontier, Kimball, and Red Willow County.

Dundy County. Sunray Mid-Continent Oil Co. 1 Shafer, C SE NW 31-3n-37w, opens East Indian Creek field. The discovery well, 1 mile east of Indian Creek field, pumped 35 bbl. of oil per day from Lansing-Kansas City. Sunray 1 Ham, NW SE 29-3n-37w, Dundy County, was named Rock Creek field. It is 2½ miles northeast of Indian Creek field. This well pumped 68 bbl. of oil per day from Lansing-Kansas City.

Frontier County. Spring Creek field was discovered by Blair & Associates et al. at 1 Zimmer in C NW SW 33-6n-30w. The well is not yet completed. Location is 7 miles north of Barger field and is the county's first producer.

Kimball County. Juniper Oil & Mining Co. opened Otter field at 1 Robinson in C NE SE 6-15n-55w, Kimball County. This well pumped 102 bbl. of oil from "J" sand and 25 bbl. water daily. Location is 1 mile north of Hilltop field. Tom Vessels completed 1 Hanson in C SW SW 29-14n-54w to open Pintail field. The well made 63 bbl. of oil daily from J sand on pump.

Red Willow County. Tipps Drilling Co. et al. 1 Haag, C NE NE 31-2n-26w, opened Silver Creek South field. The well, 2¼ miles southeast of Silver Creek field, pumped 96 bbl. of oil per day, cut 1% water, from Lansing-Kansas City.

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Canadian geologists slate field trip

THE Alberta Society of Petroleum Geologists and the Geological Association of Canada are jointly sponsoring a convention and field trip to be held September 7-9, 1961.

Twenty-two technical papers covering the history of Canadian sedimentary basins from Precambrian to Quaternary will be presented at the 2-day technical session. These papers will cover sedimentary basins of western Canada south of the sixtieth parallel, the Maritime provinces, Quebec, Ontario, and the Hudson Bay Lowlands.

FOCAL POINT of field trip is Savanna Creek gas field in Canadian Rockies. Savanna 3A is being drilled on Plateau Mountain, 8,100 ft. above sea level. Savanna field produces from the same rocks as those exposed in foreground cirque but on a lower fault block. Continental Divide in background.

Field Trip September 9

Attention will be focused on producing fields in the Disturbed belt and on structure and stratigraphy in the Foothills and Rocky Mountains. Route: Calgary, Turner Valley (Canada's first major oil field), Savanna Creek (the only gas field in the Canadian Rockies), and Kanaskis; transportation by chartered bus.

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June 23, 1961.

New Berlin field extended in Ohio

In Ohio a half-mile-westward extension of New Berlin pool into Green Township, Summit County has been announced by the operator, C. Brannan Jr.

The Clinton sand at 4,281-4,329 ft. had 1,043 M.c.f.d. and an estimated 12 bbl. of oil after fracture. Shut-in rock pressure of the W. & L. Lauby, Section 13, was 1,300 psi.

In West Central Ohio, H. H. & R. Oper. Acct. test in Union Township, Union County is now drilling at 2,745 ft. Location of this remote wildcat is on Zenith Holding & Trading Co., MS 7474.

Big gas flow reported at Southeast Oklahoma well

The second pay for a confirmation well in Coal County, southeastern Oklahoma, is reported by Tenneco Oil Co. at 1 Mike Mayer, S½ SW NE 1-1n-9e.

A drill-stem test at 8,185-8,206 ft. in Oil Creek Ordovician sand flowed 21 M.M.c.f.d. through ⅝-in. choke. Location is 1 mile north-

west of the discovery well of South Centrahoma field.

The 1 Hudson was completed last October pumping oil and salt water from basal McLish Ordovician sand and gas and salt water from Oil Creek sand. The confirmation well also flowed 12,800 M.c.f.d. during drill-stem test in the lower McLish sand.

Two Kingfisher producing areas appear to link up

Northeast College Corner and East Hennessey fields apparently are approaching connection at National Associated Petroleum Co. 1 Crosswhite in C NE SW 8-19n-5w.

The important linkup discovery flowed 200 bbl. of oil in 18 hours from Meramec Mississippian through open hole at 6,320-6,461 ft. Gage from Cleveland sand was 915 bbl. in 18 hours from 5,642-56 ft. Flow was through ½-in. choke from both pays.

Cleveland County. In Central Oklahoma, the fifth producer is being finished at South Corn field. The well is on the north side. It is Monsanto Chemical Co. 1 Polk in SE SE SE 11-9n-3w. Flow was 29 bbl. of oil hourly for 14 hours through 16/64-in. and 20/64-in. choke from perforations in the Bromide Ordovician sand at 9,618-35 ft.

Arkoma sets fast pace

ARKOMA BASIN exploration and development is anything but slowing down. Apache Oil Corp. made final flow test at 1 Etchison in NW SE NE 4-7n-18e, near shallow production in Carney field, Pittsburg County, southeastern Oklahoma.

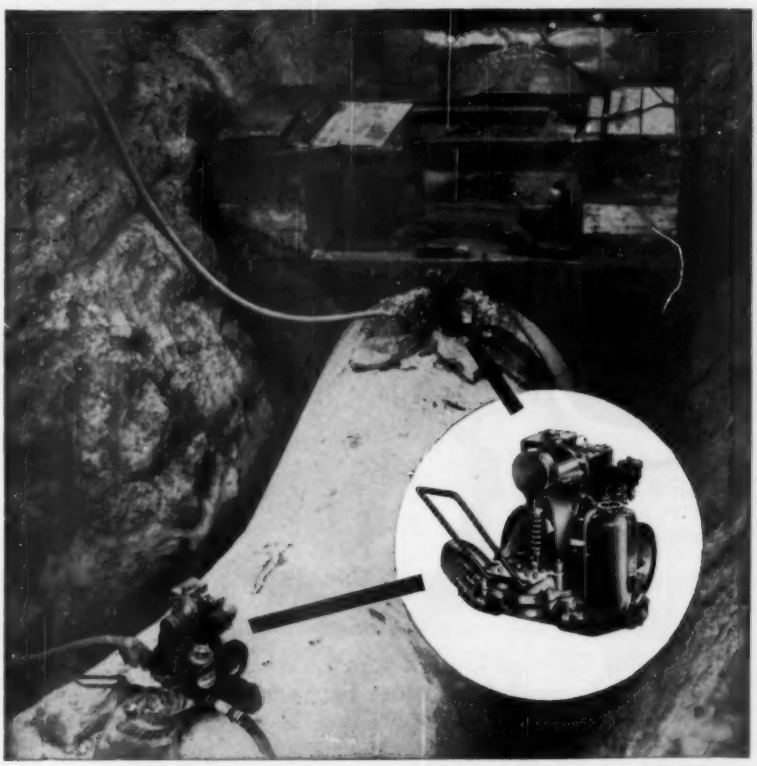
Perforations at 6,184-6,212 ft. in deep basal Atoka Pennsylvanian flowed 3,222 M.c.f.d. through ½-in. choke. Open flow was calculated at 4,707 M.c.f.d. E. G. Rodman has taken farmout from Ambassador Oil Corp. and is drilling 2 Scott in C NW 34-8n-20e, Kinta district, Haskell County. This will be a 6,200-ft. Cromwell test.

Mobil Oil Co. staked 1 Adams-State unit in C SE NW 12-7n-19e, for a third try in South Lewisville pool, Haskell County. The 6,600-ft. Cromwell test will be drilled by Fleet Drilling Co.

Mobil 1 Henderson in SW NW SE 10-7n-19e flowed 2,146 M.c.f.d. from Cromwell sand at 6,532-50 ft. Operator has now perforated Spiro sand at 6,078-6,112 and 6,124-34 ft. Sinclair Oil & Gas Co. is drilling at 1 Bullard in C NW SE 4-7n-19e. This is a tight hole.

Three offsets planned. Midwest Oil Corp. plans to drill in several areas of the basin. The company will drill 1 Smith unit, a 7,500-ft. wildcat in NW NW SE 11-8n-26e, LeFlore County. This is the first offset to the 1 Floyd Morris in SW NE Section 12. That well was completed in April flowing 2 M.M.c.f.d. from perforations at 5,205-62 ft. in Atoka sand. It revived old Rock Island gas field, a shallow producing area with two abandoned gassers. Two field wells are slated for deep Norris-Red Oak in Latimer County. One well, 1 Gallagher, C SE NW 13-6n-21e, will go to 12,000 ft. The 1 Heston Martin, C SW NE 3-6n-22e, will go to 12,500 ft.

57 DIAPHRAGM PUMPS ON THIS JOB...AND 47 ARE GORMAN-RUPP



The Brea (California) pipeline job consists of 14 miles of 96" cement-coated steel pipe. Diaphragm pumps were selected because they can be easily moved from bell joint as the welders progress. Contractors: Morrison-Knudsen, Inc. and Macco Corp. of Los Angeles.

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East Texas well taps James Lime

A NEW James lime discovery in East Texas flowed 350 bbl. of oil per day through 12/64-in. choke from perforations at 9,927-40 ft. The well is Atlantic Refining Co. 1 William E. Bruton in the Jose Juan Martinez Survey, A-993, 4 miles northeast of Poyner, Tex.

This well is 2¾ miles north-northwest of Fairway field in southern Henderson County. Nearest Fairway production is Sun Oil Co. 1 Miller-Hurt in the Isaac Roberts Survey, A-658, completed recently from James perforations at 10,099-10,108 ft. That well flowed 308 bbl. of 46°-gravity oil daily through 12/64-in. choke. Gas-oil ratio was 1,880:1. The new well by Atlantic had about 90 ft. net pay in the James.

Field consolidated. Fairway, West Fairway, and West Frankston fields, northeastern Anderson and southeastern Henderson counties, have been consolidated under the name Fairway field. Field will be operated under the present rules for Fairway, including 80-acre proration units with 80-acre tolerance.

Pokey field. Ralph Spence and Associates completed dually at B-1 C. C. Favors in the Juan L. Chavert Survey, opening first Pettet production in Pokey field, southern Limestone County.

The new well is 4½ miles southeast of Thornton. It had a calculated open flow of 6,400 M.c.f.d. and 5 bbl. condensate per million. Perforations in Pettet were at 6,872-92 ft. From Travis Peak at 7,072-98 ft. the well had a calculated open flow of 4,200 M.c.f.d., gas-liquid ratio 119,000:1. Two other Travis Peak wells have been completed in this field. It was opened at Spence 1 Favors Estate in 1959, J. L. Chavert Survey. Union Producing Co. completed 1 A. H. Miller on the same survey in 1960.

Reilly Springs confirmed. Sinclair completed 1 A. M. Whitehurst in southern Hopkins County pumping 35 bbl. of oil daily, confirming Reilly Springs field. Production is from perforations at 4,269½-72½ ft. in Coker sand of the Sub-Clarksville. Location is 3 miles north of Yantis and 950 ft. southwest of the field discovery well, 1 Shelton. That well made 56 bbl. per day when completed in May.

Leona field. Raymond Hedge & Associates will drill an 8,000-ft. Woodbine wildcat 2 miles east of this new field in southeastern Leon County. The 1 Ernest Oden will be on the William Johnson Survey, A-11, 4 miles southeast of Leona.

Nearest production in the three-well Leona field is Hedge 1 Mary Jackson on the Brewster Allen Dimery Survey, A-5. That May completion flowed 283 bbl. of 37.5°-gravity oil daily from Sub-Clarksville perforations at 7,114-19 ft. through 24/64-in. choke.

Hedge is taking potential at 1 M. Oden on the Alse Garrett Survey, A-7, the field's third well. It flowed 140 bbl. of 37.8°-gravity oil daily through 20/64-in. choke from perforations to 7,102-8 ft.

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Clearfork discovery finaled in Winkler County, W. Texas

A flowing Clearfork discovery was completed in Halley field, Winkler County, West Texas. The discovery well is Sinclair Oil & Gas Co. 11 Sealy & Smith unit, 12 miles north of Monahans.

This new-pay discovery flowed 212 bbl. of 39.5°-gravity oil daily plus 23 bbl. of water on potential test through 14/64-in. choke. Perforations are at 5,251-61 ft. The well also indicated Pennsylvanian gas - condensate production. Gas flowed at the daily rate of 6,470 M.c.f. on test at 8,042-8,116 ft. plus 41 bbl. of 68°-gravity condensate in 20 hours. Location is in Section 71, Block A, G&MMB&A Survey.

New Mexico. U. S. Smelting, Refining & Mining Co. completed a Pennsylvanian discovery in new Lea-Bone Spring and Devonian field in southwestern Lea County, Southeast New Mexico.

The 1-11 Federal, 5 miles north of Lea in 11-20s-34e, flowed 1,922 M.c.f.d. from perforations at 13,034-54 ft. Earlier completion in the Bone Spring got 205 bbl. of 42°-gravity oil per day through 40/64-in. choke from perforations at 10,158-66 ft.

Mississippian pay opened in northwestern Jack County, Texas

Gulf Oil Corp. opened Mississippian oil production at 1 B. N. Quisenberry, 1½ miles southwest of Antelope in northwestern Jack County, North Texas.

Nearest production is 7 miles north at Tex-Am Strawn Pennsylvanian field. The new well flowed 200 bbl. per day on 16/64-in. choke from perforations at 5,442-78 ft. The field will be called Antelope Mississippi field. Location is in Section 15, M. Rockerfellow Survey, A-484.

Wilbarger. Lloyd Patton completed 1 W. T. Waggoner Estate "TT" as a Strawn Pennsylvanian discovery in northeastern Wilbarger County.

The well, 5 miles southwest of Harrold and 1 mile northeast of Patton-Carter Caddo field, flowed 191 bbl. daily on 16/64-in. choke from open hole at 3,896 ft. Location is in Section 3, SPRR Survey.

Confirmation well completed in Stephens County, North Texas

A dual Mississippian and Caddo Pennsylvanian confirmation discovery is reported in southeastern Stephens County, North Texas. The well is Harding Brothers 3 S. P. Robertson, confirmation to 2 Robertson.

The new well flowed 300 bbl. of oil in an 18-hour test through 9/64-in. choke from perforations at 4,314-40 ft. in Mississippian. The Caddo zone at 3,545-61 ft. got 99 bbl. of oil daily through 8/64-in. choke. Location is in the A. S. Johnston Survey, 56, 15 miles northwest of Breckenridge.

Texas' Rodessa well gets oil shows

OIL SHOWS are reported on a Rodessa drill-stem test at a wildcat on Concord salt dome in north-central Anderson County, East

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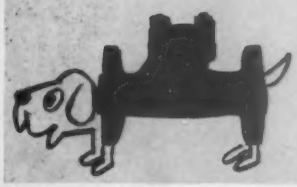

We're on page 73

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Texas. The indicated discovery, one which would reopen production on a dome that had some oil for awhile, is Humble Oil & Refining Co. and Ohio Oil Co. 1 M. C. Calhoun, on the east side of the dome, 8½ miles northeast of Palestine in the John Little Survey.

The test was at 10,030-61 ft.

Texas' Red Willow County adds another oil discovery

Another oil discovery is reported in southern Nebraska's Red Willow County. The new addition is Simmons Oil Co. and Far West Trading Co. 1 Fischer in C NE NW 25-2n-27w.

The operators swabbed 25 bbl. of oil per hour and are installing pump. Recovery is from Lansing-Kansas City Pennsylvanian perforations at 3,363-72 ft. Location is 1¼ miles southwest of Silver Creek field.

Stuarco Oil Co. et al. 1 Olson, C SE NW 10-19n-55w, Banner County, flowed 30 bbl. of oil per hour from "D" sand perforations at 5,306½-14 ft. Location is 1¼ miles northeast of Davis field.

Third well indicated at Oklahoma's Northwest Blanchard

A 1960 discovery area in Grady County, southwestern Oklahoma, has its third well in prospect. It is Cleary Petroleum Inc. 3 Hilltop in C NE SW 8-8n-5w, Northwest Blanchard field.

A drill-stem test at 11,808-94 ft. got 2,060 M.c.f.d. On ¼-in. choke it flowed 1,930 M.c.f.d. Pay is Bromide sand. This is the northwesternmost well in the area. The discovery was completed in C NE SW 16. It flowed 30,500 M.c.f.d. with 10 bbl. condensate per million from perforations at 11,715-65 ft. in First Bromide Ordovician sand and 11,773-11,810 ft. in Second Bromide sand. The second well in C NE 17 flowed 16 M.M.c.f.d. with 69 bbl. condensate per million from perforations in 11,812-39 ft. in Bromide sand.

Ellis County. Another well was completed in Chaney field, Ellis County, northwestern Oklahoma, leaving only one dry section be-

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FITTINGS

tween Chaney and South Chaney gas fields. Pan American Petroleum Corp. 1 Mace unit, C SE NW 2-23n-25w, on the southwest corner of Chaney field, flowed 4,200 M.c.f.d. from Morrow Pennsylvanian sand at 8,276-78, 8,222-26, and 8,250-54 ft. South Chaney field has but one well, 2 miles south in Section 14.

McClain County. In South Central Oklahoma, Fred Morgan 1 Owens, C SW SW 32-6n-2w, is being completed. The well flowed 338 bbl. in 14 hours on 20/64-in. choke, natural, from perforations in upper Hart sand at 7,398-7,410 ft. From lower Hart sand at 7,518-38 ft. it made 2 bbl. per hour.

Frio oil discovery finaled in Texas' Jefferson County

A new Frio oil discovery was completed in Jefferson County, Texas Gulf Coast. The well is William K. Davis 1 Katherine Sockrider et al., 8 miles southeast of Winnie in the west-central portion of the county.

The well flowed 199 bbl. of oil daily through 8/64-in. choke from Frio perforations at 8,929-47 ft. Location is in the S. S. Munson Survey 154, A-609.

Utah's Salt wash discovery completed in Mississippian

Pan American Petroleum Corp. completed 1 Salt wash in C NW SW 15-23s-17e, Grand County, Utah, flowing 115 bbl. of oil and 9 bbl. water daily through 20/64-in. choke. Perforations were at 8,693-8,707 ft. in the Mississippian.

This discovery is 22 miles northwest of Big Flat field, a Mississippian producer, and 3½ miles south of nearest drilling.

Texas' Concho County gets oil discovery

In Texas, Sunray Mid-Continent Oil Co. has completed 1 Henderson as an oil discovery in Concho County.

Located in Section 55, Block 8, H&TC Survey, the well pumped a potential of 85 bbl. of 38.6°-gravity oil a day from perforations at 2,393-2,401 and 2,404-5 ft. in the Hope lime and perforations at 3,323-27 and 3,717-21 ft. in the Canyon sand. Total depth was 4,320 ft.

The discovery is located 10 miles southwest of Eden, Tex. Nearest production is Pfluger field 6 miles southeast of the new well.

Strawn Pennsylvanian well completed in Brown-Bassett

West Texas' Brown-Bassett gas giant gained a Strawn Pennsylvanian gasser at Mobil Oil Co. and Western Natural Gas Co. 1 Brown-McNinch Estate unit, 29 miles northeast of Dryden in Terrell County.

This is the second Strawn producer in the field, located 2½ miles southwest of the first Strawn well there. The new producer was completed flowing calculated absolute open flow 6,200 M.c.f.d. from perforations at 11,940-12,042 ft. in the Strawn sand; from Ellenburger Cambro-Ordovician lime perforations at 14,535-14,612 ft. and 14,618-14,758 ft. it made 15,200 M.c.f.d. This extends Ellenburger production in the field 1 mile southeast. Location is in Section 31, Block 161, GC&SF Survey.

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JENSEN JACKS

Waltman extension flows gas in Lance Cretaceous

A Wyoming north extension discovery flowed gas-condensate from Lance Upper Cretaceous. The well is the California Co. 3 Waltman unit in SW SW 30-37n-86w, Natrona County, Wyoming.

Flow was 4,725 M.c.f.d. and 45 bbl. condensate per day on test of the Lance from a notch at 5,888 ft. This is the first successful try north of the Waltman unit discovery, an important 1960 discovery.

Discovery wells

WESTERN CANADA

Alberta:

GS-Union 7-28 Bittern Lake, LSD 7, 28-47-21w4. Basal Quartz gas discovery. TD 5,493 ft.

Shell Oil Co. et al. 4-15 Harmattan, LSD 4, 15-32-4w5. D3 gas discovery. TD 11,060 ft.

COLORADO

Logan County:

Tipps Drilling Co. 1 Sindt, C SW NW 15-11n-53w. IPP 17 BOPD and 45% water, "J" sand 5,467-73 ft. TD 5,541 ft. "J" sand discovery, new field.

Montezuma County, Lebanon unit:

California Co. 1 Unit, SW SW 20-38n-15w. IPF 450 M.c.f.d., open 2-in. tubing, Cutler 3,200-14 ft. TD 7,930 ft. Cutler discovery, new field.

Morgan County:

Forest Oil Corp. 22-2 Dunne, C SW SE 22-4n-58w. IPF 480 BOPD, ½-in. choke, TP 125-180 psi., CP 725 psi., "D" sand 5,764-75 ft. TD 5,871 ft. "D" sand discovery, new field.

KANSAS

Cowley County:

Gralapp & Everly 1 Bolack, SE NW NW 21-32s-6e. IPP 29 BO and 35 BWPD, 50°, Cattleman 2,842-49 ft. TD ? New oil discovery.

Pawnee County:

Mull Drilling Co. Inc. 1 Harms, NW SE NW 23-20s-19w, 8 miles northeast of Burdett. IPP 41 BOPD, no water, Cherokee Penn sand 4,218-23 ft. TD 4,305 ft. New oil discovery.

SOUTH LOUISIANA

Iberville Parish:

Olin Oil & Gas Co. 1 Joseph Lorio Est., 3½ miles southeast of West Rosedale field in 14-8s-9e. IPF 369 BOPD, 1/10% b.s. and w. plus 262 M.c.f.d., 10/64-in. choke, TP 1,800 psi., 33.8°, GOR 710:1, Frio 10,319-24 ft. TD 11,014 ft. New oil discovery.

Lafourche Parish:

U. S. Oil of Louisiana B-1 W. Alton Jones, 49-17s-21e. IPF 345 BOPD, 10/64-in. choke, 12,557-70 ft. TD 13,026 ft. New oil discovery.

NEBRASKA

Dundy County:

Sunray Mid-Continent Oil Co. 1 Ham, NW SE 29-3n-37w. IPP 68 BOPD, Lansing-Kansas City 4,216-4,387 ft. TD 5,062 ft. Lansing-Kansas City discovery, new field.

Red Willow County:

Tipps Drilling Co. et al. 1 Haag, C NE NE 31-2n-26w. IPP 96 BOPD, cut 1% water, Lansing-Kansas City 3,270-3,440 ft. TD 3,602 ft. Lansing-Kansas City discovery, new field.

NEW MEXICO

Lea County:

Don C. Wiley and Dick Lowe 1-Q Mobil-State, 8 miles southeast of Marjamar in 36-17s-33e. IPF 649 BOPD, 28/64-in. choke, 36°, GOR 669:1, TP 335 psi., CP 785 psi., Queen sand 3,933-38 ft. TD 4,018 ft. New oil discovery.

Rio Arriba County:

Val R. Reese & Associates 2-4 Campos, NE SW 4-23n-7w. IPF BOPD, 20/64-in. choke, TP 75 psi., CP 600 psi., Gallup 5,662-5,899 ft. TD 5,975 ft. Gallup discovery, new field.

P-M Drilling Co. 1 Bayless, NE NE 15-28n-1w. IPP 85 BOPD, 38°, Gallup Cretaceous open hole 4,150-4,429 ft. TD 4,529 ft. Gallup discovery, new field.

Roosevelt County:

David Fasken 1 Bernice M. Green, 16 miles southeast of Milnesand in 30-8s-38e. IPF 309 BOPD, ¼-in. choke, 45.5°, GOR 1,121:1, TP 750 psi., packer, Bough "C" sand 9,451-55 ft. TD 9,470 ft. New oil discovery.

San Juan County:

Grossman & Pettus 1 Hunt, C NE SW 3-29n-16w. IPP 151 BOPD, 30 BWPD, 49°, Gallup 3,498-3,520 ft. TD 3,567 ft. Gallup discovery, new field.

Paul F. Rutledge 1 Navajo-Ute-A, C SE SE 8-31n-16w. IPP 5 BOPD, GOR 2,773:1, 39°, Gallup 1,487-1,617 ft. TD 1,734 ft. Gallup discovery, new field.

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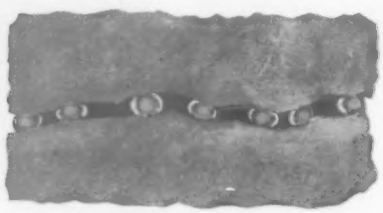

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WHY 754,900 FEET OF SPANG PIPE WERE USED FOR NEW SEADRIFT PIPELINE

Seadrift Pipeline Corporation, a subsidiary of Union Carbide Corporation, used three quarters of a million feet of SPANG seamless line pipe in their new 108-mile dual pipeline from Seadrift, Texas, to the Humble Oil Company gas plant near Ella, Texas.

There are many reasons why oilmen feel safe when they specify SPANG pipe. They know that SPANG has taken every precaution to assure strength, ductility and uniformity of the pipe. SPANG pipe has been serving industry needs successfully since 1840. It is produced by National Supply, the world's largest supplier of oil country equipment and products.

These are a few of the reasons why SPANG pipe is preferred by oilmen. The next pages cover additional reasons.

PIPELINERS FIND SPANG SEAMLESS PIPE IS

754,900 feet of SPANG seamless line pipe were used by the Seadrift Pipeline Corporation, a subsidiary of Union Carbide Corporation, in this new pipeline from Seadrift, Texas, to Ella, Texas. Order was made up of 3½", 4½", and 6⅝" O.D. pipe.

DUCTILE, EASY TO WELD, UNIFORMLY ROUND

Stringent quality control in every phase of production and shipment. This is probably the most important reason for the superiority of SPANG pipe in gathering, distribution and transmission lines.

Quality control is a specialized business in National Supply's modern Ambridge mill, where SPANG pipe is made. This control starts with the chemical and physical properties of the steel and is carried through every step of production and inspection.

The finished pipe is subjected to thorough testing through internal and external surface inspections, hydrostatic tests and dimensional controls, such as O.D., wall thickness, end bevel and straightness checks.

At the end of production and inspection cycles, and before SPANG is stenciled on the pipe, we are sure it meets the appropriate API specification.

Uniformity of SPANG pipe is an important benefit. The uniform roundness speeds welding. And pipeline crews like the SPANG ductility for operations over rough terrains.

SPANG seamless line pipe for gathering, transmission and distribution lines is readily available in sizes from 2 inches (nom.) through 14 inches O.D., and in specifications API STD. 5L and API STD. 5LX.

Next time you buy pipe, play it safe. Order SPANG seamless pipe from your National Supply representative, or write to National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pa.

Stenciling the SPANG name is final step in production of high-quality pipe under standards that meet API specifications.

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SPANG pipe is produced by National Supply at Ambridge, Pa., in a modern pipe mill, where quality control is the prime consideration.

SPANG PIPE SPEEDS INSTALLATION OF GATHERING AND FEEDING LINES

National Supply also produces SPANG CW butt-weld pipe under stringent controls. Every length is hydrostatically tested and inspected for thread quality and uniformity.

All SPANG pipe is made of carefully selected steel that meets the toughest standards. This control assures you of pipe that is easy to work, because it is easy to cut, bend, thread and weld.

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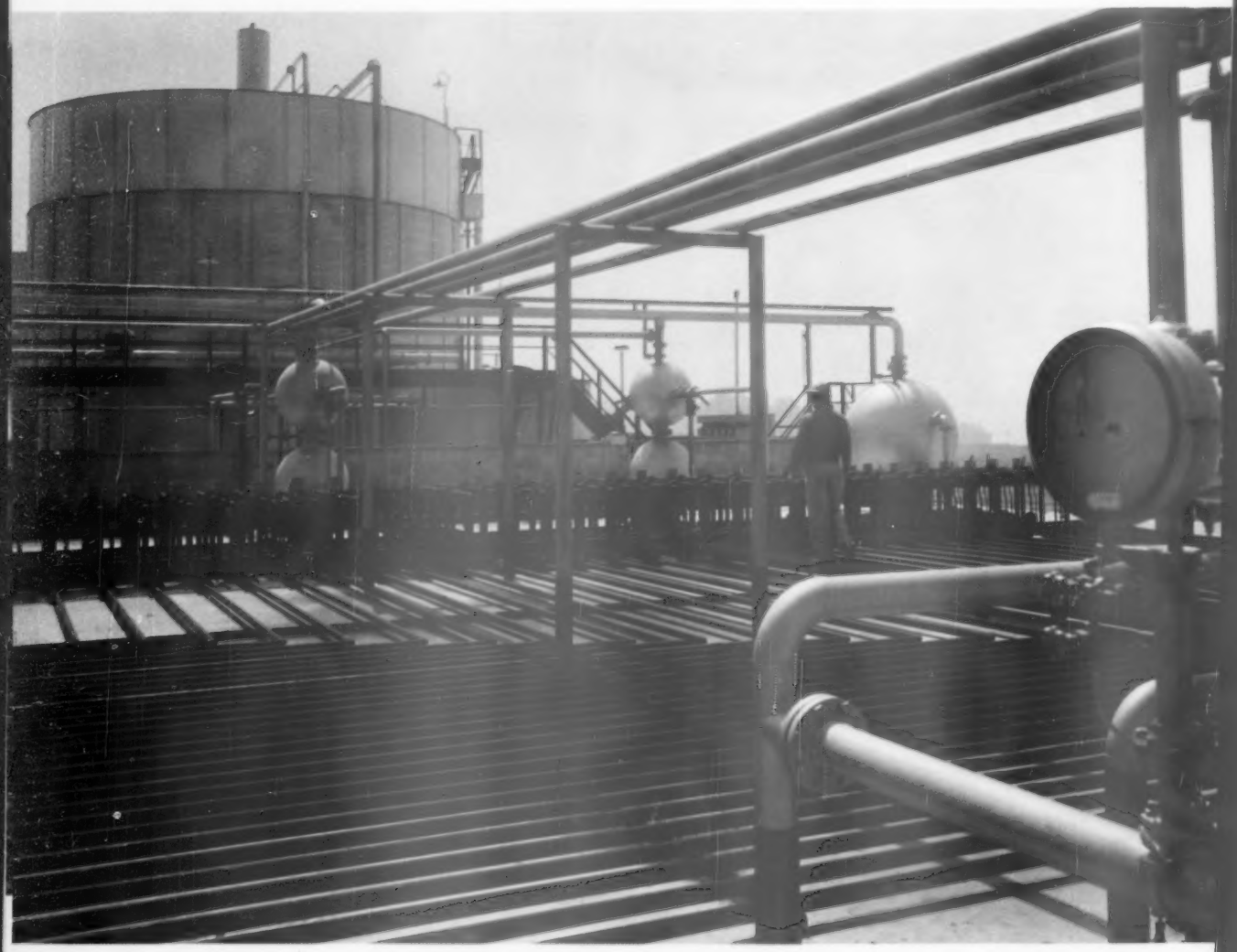


Gathering line service is one of many oil field applications for SPANG CW pipe. In addition to gas, oil and water lines, you can use it for many structural purposes.

ARMCO National Supply Division

Oakah L. Jones . . . modern regulation must keep pace.

New CGA President Sets Goals

. . . for association program during his term. Promotion of research and industry unity are high on Oakah Jones' list.

THE new president of the Canadian Gas Association, Oakah L. Jones, promises that the association will strive to bring closer together the distribution, transmission, and production segments of the gas industry.

Also he says much time will be devoted to research with special efforts to encourage more U. S. and other foreign participation in Canadian research.

Hand in hand with these objectives, Jones feels that to have a stronger gas industry, all-out encouragement should be given to both appliance and equipment manufacturing industries in Canada.

Jones, president and general manager of Consumer's Gas Co., Toronto, has spent his entire career in the gas and electric utility industries and is especially interested in the regulatory end.

He says: "Operating men can and should play a much greater part in understanding the purposes of regulation and how they and their departments can, by performing their jobs properly, help avoid that adverse, extreme, and stringent regulation which is neither desired nor desirable from the standpoint of the customer, the investor, or the employe."

Modern regulation, Jones believes, must keep pace with modern times if the same pitfalls now faced by the railroads in Canada and the U. S. are to be avoided.

Jones is well equipped to handle his new position with CGA. He was formerly very active in the American Gas Association and is still a member of the AGA board of directors and the executive committee.

Originally from Boston, Jones worked for an electric utility in Canada for several years after World War I. He attended Brown University and later the University of Tulsa. He remained in Tulsa and went to work for Oklahoma Natural Gas in 1936.

Prior to accepting a position at Consumer's as vice president and general manager in 1954, Jones was vice president of ONG. Before that, he was assistant secretary and treasurer with ONG.

He says his primary hobby is civic work. While in Tulsa, he was very active in the Red Cross program; was president of the Chamber of Commerce; on the advisory board of the University of Tulsa; and a consulting professor at Oklahoma State University.

▶▶▶ Personals

Serving with **Oakah L. Jones** (see above) as officers of Canadian Gas Association will be **J. W. Ostler,** Canadian Meter Co., first vice president, and **D. Cass-Beggs,** Saskachewan Power Corp., second vice president. **R. C. McPherson,** Canadian Western Natural Gas Co., is immediate past president of CGA. Directors of the association will be **G. Crothers,** General Controls Co. (Canadian); **G. M. Douglas,** Union Gas Co. of Canada; **W. L. Dutton,** United Gas, Ltd.; **A. R. Elliott,** Greater Winnipeg Gas Co.; **R. K. Farris,** Northern Ontario Natural Gas Co.; **J. H. Hobbs,** Iron Fireman Manufacturing Co. of Canada; **J. W. Kerr,** Trans-Canada Pipe Lines; **J. E. Lee,** Consumers' Gas Co.; **B. H. McGill,** Eclipse Fuel Engineering Co. of Canada; **J. A. McMahon,** Inland Natural Gas Co.; **E. W. Pickett,** General Steel Wares, Ltd.; **W. D. Porter,** Mid-Canada Contractors, Ltd.; **S. Raborn, Jr.,** Canadian Delhi Oil, Ltd.; **R. C. Robbins,** Lennox Industries (Canada); **M. E. Stewart,** Northwestern Utilities; **E. D. Sutcliffe,** B. C. Electric Co.; and **B. F. Willson,** Canadian Western Natural Gas Co. **W. H. Dalton** is CGA managing director.

George B. Hickok, district geologist for Humble in Shreveport, La., has been promoted to district exploration manager there.

E. D. Loughney, president of British American Oil Co., has been elected to a 3-year term as a director of the Sulphur Institute, Washington, D. C.

Hal L. Shockley has resigned as executive vice president of Gibson Petroleum Co., Ltd., Calgary. He will continue as a director of the company. **R. W. A. Laidlaw** has taken over crude-oil purchasing and marketing operations for Gibson.

Personals

J. W. Kirstein, field superintendent of pipelines in Beatrice, Neb., for Natural Gas Pipeline Co. of America, has been named general superintendent of the construction division, a new post in the Chicago home office. **E. C. McCann,** assistant field superintendent of gathering lines in Fritch, Tex., will succeed Kirstein. **W. C. Gibson,** district superintendent of storage in Herscher, Ill., for Natural Gas Storage Co. of

KIRSTEIN

McCANN

Illinois, an affiliate, will succeed McCann in Fritch. Gibson will be replaced by **C. A. Arthur,** district superintendent in Bridgeport, Tex. **J. B. DeLille,** district pipeline superintendent in Minneola, Kans., will succeed Arthur. **M. R. Poulain,** district engineer in Minneola, has succeeded DeLille as district pipeline superintendent there.

Joe R. Robinson, superintendent of Shell Oil Co.'s Zionsville, Ohio, products-pipeline station, and **Ralph R. Mericle,** chief operator of the Zionsville pump station, have retired. Robinson had been with Shell 34 years; Mericle, 35 years.

William C. Marris, director of rates and economics for Panhandle Eastern Pipe Line Co., has been elected vice president, rates and economics.

Henry deForest Ralph, Jr., associate research engineer with Standard Oil Co. of Texas in El Paso, Tex., has joined Trunkline Gas Co. in Houston as engineer.

R. W. Campbell, vice president and general manager of Home Oil, Ltd., Calgary, has been elected a director of Trans-Canada Pipe Lines, Ltd.

Kenneth H. Bowman, engineer for Service Pipe Line Co. in Galesburg, Ill., has been transferred to Casper, Wyo., where he will succeed **Herschel Evans.** Evans recently was named Wyoming division schedule coordinator.

John R. Byars, senior gas engineer for Pan American Petroleum Corp., has been transferred to Tulsa from Casper, Wyo.

Don Brown, district geologist for Petroleum, Inc., in Shreveport, La., has been named district geologist in Oklahoma City.

George O. Markins, division manager in charge of direct sales for Gulf Oil Corp.'s Houston division, is retiring after 37 years with the company.

Ed A. Meaney, assistant design engineer in American Oil Co.'s plant-engineering department, has been promoted to associate design engineer. **Hal E. Parrish,** assistant construction and maintenance engineer, has been promoted to associate construction and maintenance engineer, plant-engineering department.

Operations of the old Monterey Oil Co. are being absorbed by Humble's regional organization on the West Coast. Monterey has been operated as a division of Humble since its sale. Now the Monterey division and Humble's California area are being merged to form the Los Angeles area, a new unit. **R. E. Faggioli,** manager of the California area, has been named manager of the Los Angeles area. He will take over this post after completing a temporary assignment in Houston as executive assistant to the president. **N. N. Jones** will be acting manager of the Los Angeles area during Faggioli's special assignment. Jones will later become area production manager. **A. W. Gentry,** president of the Monterey division, will serve as acting area production manager during the interim period. **J. R. Jackson,** California area geologist, has been named exploration manager for the Los Angeles area. **J. L. Spivey,** who has been on a special marketing assignment in the California area, has been named area marketing manager. **E. E. Pyles,** vice president of the Monterey division, has been named assistant to the area manager. Two new production districts have been set up with **C. H. Best** as district superintendent in Bakersfield and **W. B. Quesenbury** as Long Beach district superintendent. **H. McKim,** district marketing manager, will continue as Los Angeles district marketing manager. Also in the new area, **B. L. Smith** has been named employe relations manager; **W. R. Gardner** has been named area attorney; and **T. M. Roper** has been named administrative services manager.

New research engineers at California Research Corp.'s Richmond, Calif., laboratory, are **James O. Love,** chemicals division; **Frederick L. Scholes,** instrument development; and **Joseph Jaffe,** petroleum-process division. **Carroll J. Wedel** has joined the chemicals division at Richmond as research chemist, and **Jay E. Kent** has been named research chemist in petroleum products. **Dr. Thomas G. Spiro** has joined Cal Research in La Habra, Calif., as research chemist, producing research.

R. A. Appleman has been named manager of Esso International Co.'s new traffic department. Appleman formerly was general traffic manager for Humble Oil & Refining Co.'s Esso Standard region.

Thomas L. Cubbage, vice president of Phillips Chemical Co., Bartlesville, Okla., has been named chairman of National Petroleum Council's technical subcommittee to the committee on petrochemicals. **Harold R. Legatski,** Phillips Chemical, will be assistant to the chairman. **Vincent Brown,** NPC, is secretary. Committee members are **Dr. J. W. Bertetti,** Crown Central Petroleum Corp.; **Charles E. Bonine,** Atlantic Refining Co.; **M. F. Granville,** Texaco; **C. W. Humphreys,** Shell Chemical Co.; **Dr. W. F. Krause,** Pure Oil Co.; **A. Lewis, Jr.,** Gulf Oil Corp.; **Dr. Howard L. Malakoff,** Cities Service Research & Development Co.; **Jesse L. Owens,** El Paso Natural Gas Products Co.; **Dr. Ernest M. Peres,** Standard Oil Co. (Ohio); **Dr. R. I. Stirton,** California Chemical Co.; and **J. E. Wood III,** Enjay Chemical Co.

▶▶▶ Personals

CHAWNER

W. D. Chawner, district geologist for Humble in Durango, Colo., will move to the company's Denver area offices August 1 to work on special geological studies. **W. E. Murrah,** Durango, will succeed Chawner as district geologist.

Don E. Lawson has been named district geologist for Forest Oil Corp. in Casper, Wyo.

Ted V. Jennings, geologist with California Oil Co. in Oklahoma City, has been transferred to Houston as geologist for Standard Oil Co. of Texas.

Jack Mills has been elected a vice president of Citizens National Bank of Los Angeles. Mills joined the bank's oil and gas division in 1960 after 9 years with Sunray Mid-Continent Oil Co.

William E. Dickinson has retired as assistant operating superintendent in charge of the mechanical and electrical department and superintendent of the communications department in Sun Oil Co.'s Gulf Coast division. He will be succeeded by **Eugene H. Wilder.**

R. R. Jenkins, director of marketing research for Continental Oil Co., has been named coordinator of facilities and economics, a new position in the headquarters marketing department. **G. F. Kershner,** director of sales training, has been named coordinator of organization and personnel, marketing, and **M. L. Roberson,** supervisor of staff services, has been named assistant to the general manager of marketing.

G. E. Otten, Denver division wholesale sales manager for Tenneco Oil Co., has been named manager of the new Denver regional sales office. **J. C. Hamilton** has been named regional wholesale manager and **R. R. Watts** has been named regional retail manager. The new regional office will be responsible for marketing operations in Colorado, New Mexico, Arizona, Kansas, Nebraska, Idaho, Utah, Wyoming, and Missouri.

Dr. T. R. Magorian, geologist with Shell Development Co., has been transferred to Houston from Midland, Tex.

John P. Breen, lease foreman for Shell Oil Co. in Elk City, Okla., has been promoted to production foreman and transferred to Baker, Mont.

Chester L. Jones, assistant director of marketing for Monsanto Chemical Co.'s plastics division, has been named director of marketing. He succeeds **R. Carl Evans,** who has been named associate director of Monstanto's purchasing and traffic department. Jones and Evans will headquarter in St. Louis.

F. G. Bollo, research director at Shell Oil Co.'s Martinez, Calif., laboratory, has been named manager of the products-application department in San Francisco. He succeeds **R. E. Jeffrey,** who has been transferred to Detroit as resident assistant manager of head office products - application department. **R. J. Moore,** assistant chief research chemist, Martinez, has been named chief research chemist there. **J. A. Edgar,** chief research engineer, Martinez, has been transferred to Wood River, Ill., as chief research engineer at the laboratory there.

Otis B. Hocker, Texaco's Denver division manager, has been promoted to assistant to the vice president. He will headquarter in New York. **Roy Whisenhunt,** assistant division manager in Midland, Tex., will succeed Hocker in Denver. **Byron L. Francis,** New York staff petroleum engineer, will succeed Whisenhunt. Francis will be succeeded in New York by **Laurie W. Folmar,** Tulsa division petroleum engineer. **Kenneth E. Myron,** New York staff geologist, has been transferred to Los Angeles as assistant to the division manager. **J. E. Ellis,** assistant division petroleum engineer in Houston, has moved to Tulsa to succeed Folmar as division petroleum engineer. **C. F. Fain,** staff petroleum engineer in the general manager's office, Houston, will succeed Ellis. **V. F. Dullnig,** assistant Midland division petroleum engineer, will succeed Fain in Houston. **J. M. Williams, Jr.,** will succeed Dullnig.

Edward A. Koester, Denver consulting geologist, has accepted an assignment with the United Nations technical assistance office as adviser to the exploration department of TPAO, Turkish Government oil company. He will headquarter in Ankara.

Shelby O. McGee, district land man in Humble's Miles City, Mont., office, has been named head of the producing - investments section in Humble's Tulsa office.

W. A. McFadden, Jr., area geologist, will head Columbian Fuel Corp.'s new Denver exploration office. **Louis J. Bevacqua** and **George T. Tennison, Jr.,** geologists, will also headquarter in Denver. Columbian Fuel is a subsidiary of Columbian Carbon Co.

H. A. Sellin has been promoted to division geologist for Mobil Oil Co. in Denver. Sellin had been working with regional geological studies in the Houston division. In Denver he succeeds **W. L. Moreman,** who has joined the staff of Mobil's field research laboratory in Dallas.

Louis L. Czyzewski, H. J. Nebelsiek, and **Wilmer M. Duvall** have been named senior project chemical engineers at American Oil Co.'s Whiting, Ind., research laboratories. New project chemical engineers at Whiting are **B. D. Barger, Jr., Richard E. Dudley, Edward L. Flom,** and **Ivan C. Lyons. John B. Durant** has been named project automotive engineer, Whiting.

A. L. Capps has been named division manager for the combined central and Michigan sales divisions of South Penn Oil Co.'s Pennzoil division. He will headquarter in Dayton, Ohio. Capps had been manager of sales promotion in the branded marketing department. **A. B. Baker,** former manager of the Michigan division, has been promoted to northern division manager in Chicago.

Personals

R. L. Jodry, L. W. Clutter, and **A. B. Boyd,** research geologists with Sun Oil Co., have been transferred to Richardson, Tex., from Billings, Mont.

Harry W. Otto has joined Esso Research & Engineering Co. as chemist. **David H. Liebman** has joined the company as chemical engineer.

L. D. Parker has been transferred by Warren Petroleum Corp. from Maud, Okla., to Duncan, Okla., where he will be plant superintendent.

Edward H. Mayer, petroleum engineer for Humble in Long Beach, Calif., has been promoted to district petroleum engineer in Bakersfield, Calif.

Robert L. Williams has joined Canada Southern Oils, Ltd., in Casper, Wyo., as geologist. Williams had been with San Jose Oil Co., Inc., in Manila, Philippines.

Earl Rodman, Phoenix petroleum engineer, has been elected president of the Oil and Gas Association of Arizona. He succeeds **W. T. Hudson,** consulting geologist, who recently moved his offices to Denver. Rodman had been serving as secretary-treasurer of the group.

H. J. McGrew, geophysicist with British American Oil Co. in Calgary, has been named geophysicist for Gulf Research & Development Co. in Harmarville, Pa.

Herbert A. Blank, assistant manager of engineering for Arabian American Oil Co. in Dhahran, Saudi Arabia, has been transferred to New York as purchasing agent for Aramco.

G. Reese Booker, geologist with Tenneco Oil Co., has been transferred to Midland, Tex., from Jackson, Miss.

Charles R. Halstead, district geologist for British - American Oil Producing Co. in Tyler, Tex., has been transferred to Houston in the same capacity.

Charles W. Saville, chairman of Texaco's executive producing committee in New York, has been named general manager of the foreign producing department (Western Hemisphere). **Edwin L. Gorham, Jr.,** has been appointed assistant general manager, operations, of the department. **Robert H. Martin,** secretary of the executive producing committee, will succeed Saville as chairman. **Robert N. Harding,** managing director of American Overseas Petroleum, Ltd., an affiliate, has been named assistant to the senior vice president of Texaco.

George T. Goggin, executive vice president of Douglas Oil Co. of California, has been appointed to National Petroleum Council by Interior Secretary **Stewart Udall.**

J. Grant Spratt has retired as president of Triad Oil Co. and will set up consulting offices in Calgary. **E. H. Tanner,** Triad chairman, will take over as president of the company.

R. F. Cox, general production superintendent for Southwest Gas Producing Co., has been elected vice president in charge of production. **Al E. Beasley,** general exploration manager, has been elected vice president, exploration.

R. O. Turner has been elected president of Camay Drilling Co. He succeeds **Tyler F. Woodward,** who recently resigned. Turner also will become president of Camdrill International, Inc., and its subsidiary companies working in Spain and Turkey.

Clifton R. White, manager of the distilling department at Shell Oil Co.'s Martinez, Calif., refinery, has been named manager of lubricating oils. He succeeds **Harold I. Lounsbury,** who has retired after 37 years with the company. **Henry Eichner,** manager of thermal cracking, has been named manager of combined thermal cracking and distilling departments at the refinery.

Deaths

Harry Wirick, 67, Tulsa oil producer, died July 2 at his farm near Siloam Springs, Ark., after a heart attack. Wirick had been active in the oil industry since 1919.

Buhl Ray Norman, 55, assistant district superintendent for Sinclair Oil & Gas Co. in Nowata, Okla., died June 28 near Pawhuska, Okla. Norman suffered a heart attack while driving his car in the area. He had been with Sinclair 40 years.

Fred E. Shaw, 78, retired superintendent of cracking at DX Sunray Oil Co.'s West Tulsa refinery, died July 1 at his home after a heart attack. Shaw retired in 1949 after 33 years with the company.

Dr. Robert Schwarz, 77, Austrian - born engineer and technical writer, died June 25 at his home in Los Angeles. Dr. Schwarz fled the Hitler regime in 1938. He had been an oil and mining publication editor in Europe and in the U. S. he became a correspondent for European publications.

Ralph R. Matthews, 77, retired executive secretary of the Independent Oil Compounders Association, died June 29 at his home in Kansas City. Matthews was vice president of Battenfeld Grease & Oil Corp. at one time.

Robert W. Adams, publicity manager for El Paso Natural Gas Co., was killed June 27 in an airplane crash at Lapush, Wash.

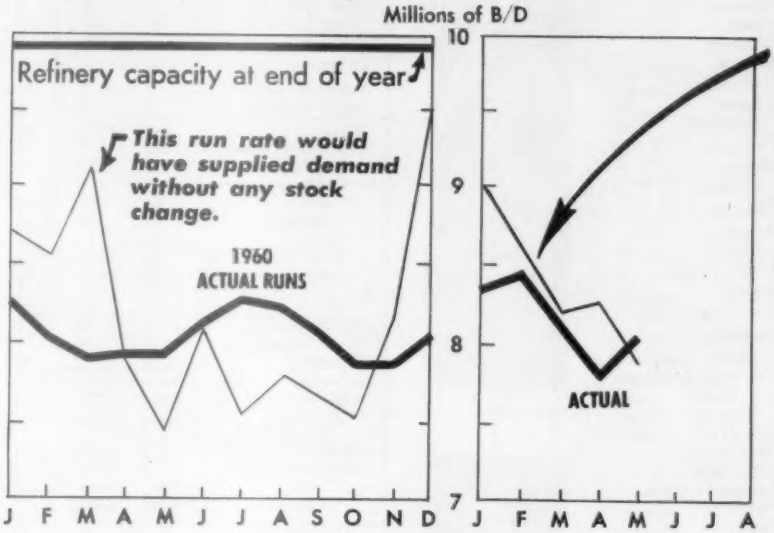
Gerald B. Coleman, 65, executive vice president of Bowen Itco, Inc., Houston oil-tool specialty manufacturing firm, and vice president of Bowen Itco, Ltd., Canada, died June 27 in a Houston hospital after a heart attack.

R. A. Mason, 72, Houston independent operator, died June 29 in a Houston hospital after a long illness.

O. R. C. (Dick) Grow, 78, retired manager of Southern Counties Gas Co.'s harbor division, died June 27. Grow retired in 1947 after 46 years with Southern Counties.

Morris Yabrove, 71, Saginaw, Mich., oil man, died June 28 after a heart attack.

REFINERY RUNS


Millions of B/D
10
9
8
7
Refinery capacity at end of year
This run rate would have supplied demand without any stock change.
1960 ACTUAL RUNS
ACTUAL
J F M A M J J A S O N D
J F M A M J J A

Runs needed to meet demand without stock change.

Seasonal stock changes are strictly optional

BY JOHN C. CASPER

REFINERS can select their own poison this year. (1) They have the refining capacity to meet expected demands during the early winter months without depending on withdrawals from product storage. (2) They can meet demand with near-constant refinery runs and large shifts in product stocks. Or, (3) they can use a combination of the two.

The chart on the left gives the alternate pictures for 1960 and the right chart shows actual and possible activity so far this year.

Look at the left chart. First the heavy line at the top represents refining capacity at the end of the year on a calendar-day basis.

Refiners' reports to the Journal last spring showed that for a single stream day, they could have processed about 10,500,000 bbl. on December 31, 1960.

On a calendar-day basis maximum runs for the industry would have been 9,930,000 bbl. daily.

The light line on the left chart gives the picture for theoretical refinery operations that would have supplied refined products to meet total demand each month of the year without any change in refined-product stocks.

Points for the line are calculated from total demand for the month less all supply items other than products refined from crude. These other items that meet part of total demand each month are: Total product imports, transfers from natural-gasoline and cycling plants, transfers from crude, crude loss, and the small amount of exported crude. If there were no changes in product stocks, refinery runs would supply the remaining segment of demand. The light line on the chart represents required crude throughput needed to meet demand without stock changes.

The curve has the general shape of the demand curve. Note that there were two high-demand months last year. The first was March when cold weather boosted heating-oil requirements. The other was December. Note that both points are well below the heavy capacity line at the top of the chart.

The heavy curve shows actual refinery runs last year. There is a very unusual comparison in the 1960 run picture. The two peak demand months were March and December. And yet refinery runs for each of these months fell well below runs for the month of July.

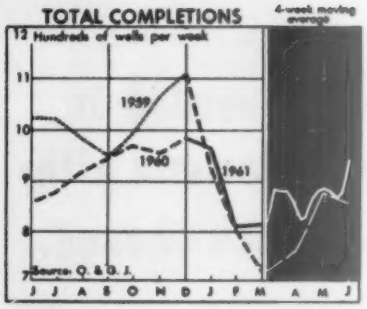
December demand averaged 29% more than demand in July and yet July runs topped December runs by 3.4%. Refiners worked hard last year to keep supply and demand out of balance.

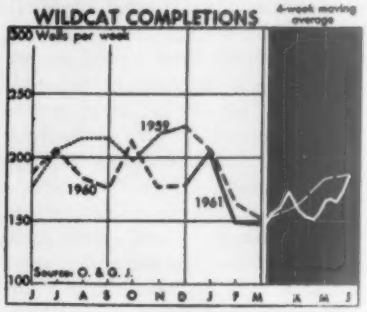
The small chart on the right gives the same comparison for the first 5 months this year.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,894,875	DOWN	35,400	UP	61,157
Crude stocks	255,502,000	DOWN	2,040,000	DOWN	2,156,000
Completions	1,092	UP	139	DOWN	268
(Data for June 30 delayed by holiday)					
Refinery runs	7,865,000	DOWN	359,000	DOWN	366,000
Gasoline stocks	203,399,000	DOWN	4,283,000	UP	157,000
Kerosine stocks	29,580,000	UP	369,000	UP	1,997,000
Distillate stocks	105,956,000	UP	3,290,000	DOWN	931,000
Residual stocks	46,091,000	UP	916,000	UP	5,499,000
Four-product stocks	385,026,000	UP	292,000	UP	6,722,000
Total imports	1,548,600	UP	43,400	DOWN	77,500

DRILLING





Active Rotary Rigs

	7-3-61	6-26-61	7-4-60
Alabama	4	3	4
Alaska	11	10	4
Arkansas	12	13	12
Arizona	2	2	0
California	69	65	81
Land	65	62	76
Offshore	4	3	5
Colorado	31	34	27
Florida	0	0	2
Offshore	0	0	2
Georgia	1	1	0
Illinois	51	49	42
Indiana	11	7	8
Iowa	1	1	0
Kansas	110	113	103
Kentucky	5	5	4
Louisiana	287	279	287
North	30	22	41
S. Inland waters	117	113	113
S. Land	82	86	81
Offshore	58	58	52
Maryland	0	0	1
Michigan	18	25	36
Mississippi	62	60	55
Missouri	2	3	1
Montana	24	22	27
Nebraska	34	36	32
New Mexico	106	102	108
New York	1	1	0
North Dakota	17	17	15
Ohio	7	8	6
Oklahoma	207	201	174
Pennsylvania	7	5	11
South Dakota	1	0	0
Texas	644	617	569
S. Inland waters	10	7	5
S. Land	191	183	161
Offshore	3	3	2
North	61	56	51
Panhandle	48	51	42
East	63	62	46
West Central	164	145	166
West	104	110	96
Utah	27	27	35
Washington	1	0	0
West Virginia	7	8	4
Wyoming	56	59	69
Total U. S.	1,816	1,773	1,717
Cum. avg. to date	1,656	1,649	1,738
Western Canada	170	168	143
Eastern Canada	1	1	2
Grand total	1,987	1,942	1,862

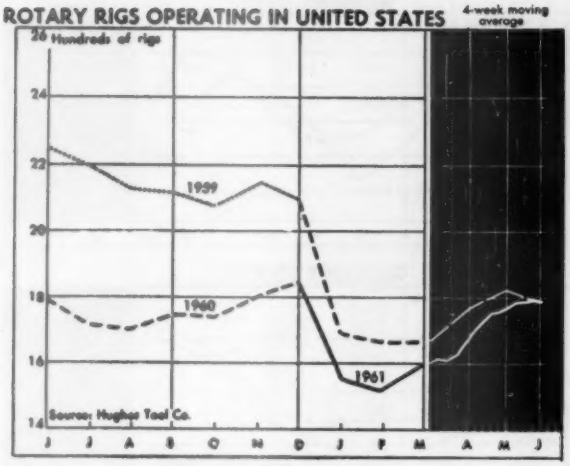
Hughes Tool Co. report.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JULY 1, 1961

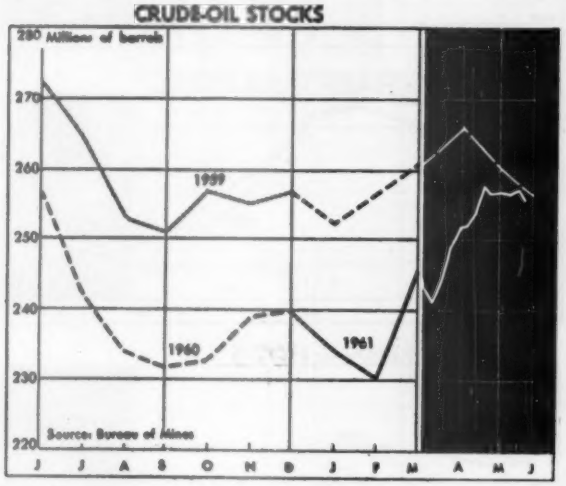
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Alabama	1	0	0	0	1	0	13,026	30	27	1	0	0	0	1	7	1
Alaska	1	0	0	0	1	0	3,230	21	7	1	0	0	0	1	3	3
Appalachian	46	17	0	14	3	12	84,836	951	825	1	0	0	1	0	33	32
Arizona	0	0	0	0	0	0	0	12	8	0	0	0	0	0	7	8
Arkansas	10	0	0	1	9	0	37,257	253	302	3	0	0	0	3	51	79
California	27	17	0	1	9	0	141,112	811	690	7	0	0	0	7	135	137
Colorado	9	1	0	0	8	0	33,847	300	313	3	0	0	0	3	148	151
Illinois	34	16	0	0	18	0	75,611	880	992	12	3	0	0	9	183	225
Indiana	25	6	0	0	19	0	32,387	322	469	6	1	0	0	5	92	178
Kansas	151	64	0	11	64	12	489,079	2,730	1,650	34	6	0	1	27	499	539
Kentucky	31	10	0	8	13	0	52,429	740	783	2	2	0	0	0	78	91
Louisiana	106	39	16	7	44	0	830,357	1,871	1,720	15	1	0	0	14	297	270
North	40	13	1	5	21	0	133,629	694	595	5	0	0	0	5	127	125
South	40	16	5	2	17	0	409,890	888	857	6	1	0	0	5	140	127
Offshore	26	10	10	0	6	0	286,838	289	268	4	0	0	0	4	30	18
Michigan	7	2	0	1	3	1	17,902	342	361	2	0	0	0	2	134	103
Mississippi	10	2	0	0	8	0	108,942	281	362	3	0	0	0	3	92	129
Montana	10	2	0	0	8	0	62,646	180	147	8	0	0	0	8	85	69
Nebraska	26	7	0	0	19	0	115,496	490	399	17	0	0	0	17	222	158
New Mexico	33	15	2	10	6	0	192,856	882	931	4	0	1	0	3	155	142
West	16	4	0	10	2	0	84,945	389	300	1	0	0	0	1	53	29
East	17	11	2	0	4	0	107,911	493	631	3	0	1	0	2	102	113
North Dakota	7	2	0	0	5	0	48,377	126	151	1	1	0	0	0	32	35
Ohio	26	14	0	1	8	3	65,416	518	493	1	0	0	0	1	23	27
Oklahoma	186	81	2	21	51	31	720,617	3,064	1,970	25	5	0	2	18	318	386
Texas	304	169	12	26	96	1	1,456,070	7,262	8,027	62	11	0	0	51	1,477	1,614
Dist. 1	18	10	0	0	8	0	46,726	447	551	6	1	0	0	5	174	207
Dist. 2	17	9	0	0	8	0	112,249	366	377	7	0	0	0	7	84	89
Dist. 3	35	12	4	6	13	0	188,527	556	620	6	0	0	0	6	110	117
Dist. 4	23	5	3	3	12	0	124,943	636	548	6	0	0	0	6	133	162
East	28	14	0	1	13	0	158,761	631	637	6	0	0	0	6	150	133
Dist. 7-B	34	16	0	6	12	0	144,995	989	1,155	10	4	0	0	6	266	328
West	78	49	5	2	21	1	445,560	1,790	2,144	15	2	0	0	13	388	332
Dist. 9	53	44	0	1	8	0	154,883	1,226	1,484	5	3	0	0	2	125	210
Dist. 10	18	10	0	7	1	0	79,426	621	511	1	1	0	0	0	47	36
Utah	7	2	0	0	5	0	39,645	128	132	5	0	0	0	5	54	45
Wyoming	25	12	0	3	10	0	102,661	482	509	11	2	0	0	9	184	210
Miscellaneous*	10	0	0	0	10	0	15,361	102	88	10	0	0	0	10	100	77
Total U. S.	1,092	478	32	104	418	60	4,739,160	22,778	21,356	234	32	1	4	197	4,409	4,708
Previous week	953	398	17	94	377	67	3,519,131			192	23	2	5	162		
Cum. 1961	†22,778	10,267	502	2,225	8,270	1,514	92,202,188			†4,409	375	50	197	3,787		
Cum. 1960	21,356	10,043	658	1,657	8,386	612	93,278,096			4,708	417	50	151	4,090		
Western Canada	36	18	0	5	13	0	196,755	1,035	1,060	6	0	0	0	6	284	301

*S. D., Tenn. †Revised.

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	6-24-61	6-17-61	6-25-60
Pennsylvania	2,386	2,389	2,134
Other Appalachian	1,676	1,734	1,731
Illinois, Indiana, Michigan	10,944	10,296	10,152
Nebraska and North Dakota	3,441	3,212	2,911
Kansas	9,965	10,077	9,646
Oklahoma	16,186	16,548	18,513
Arkansas	1,911	2,097	2,017
Louisiana	21,036	22,472	19,471
North	3,538	3,607	3,271
South	17,498	18,865	16,200
Mississippi, Alabama, Florida	2,341	2,126	1,843
New Mexico	8,069	8,122	8,153
Texas	108,511	107,809	106,804
East Texas	9,141	9,047	8,534
West Texas	48,186	47,854	48,317
Texas Gulf	19,754	19,610	18,763
Other Texas	31,430	31,298	31,190
Wyoming	19,281	19,395	18,270
Other Rocky Mountain	10,171	10,132	10,225
California	24,408	25,319	28,912
Foreign	†15,176	15,814	16,876
Total	255,502	257,542	257,658

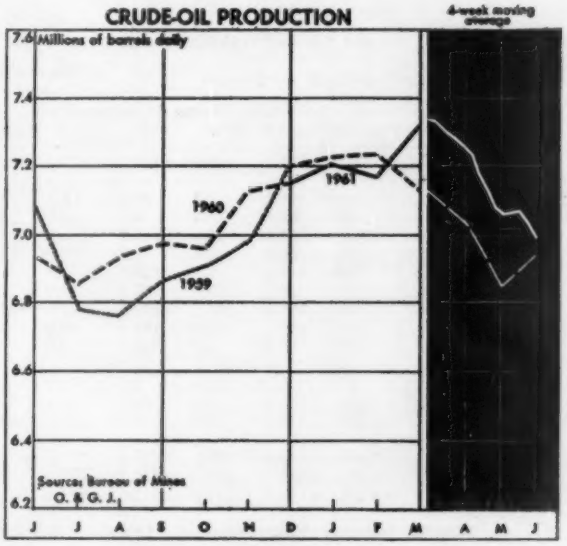
*Bureau of Mines. †Includes 3,267,000 bbl. in California.

DAILY AVERAGE PRODUCTION FOR WEEK

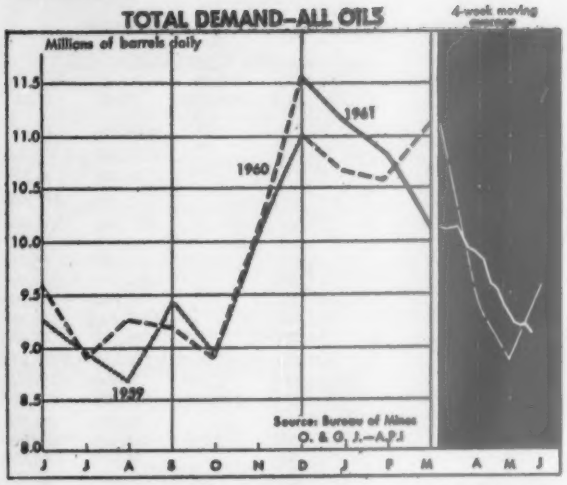
	July 1, 1961 Crude oil	Lease condensate	Total	June 24 total
Alabama	19,350	.....	19,350	19,325
Alaska	19,100	.....	19,100	19,000
Arkansas	73,525	75	73,600	75,500
California	822,500	.....	822,500	822,500
Colorado	127,000	.....	127,000	128,000
Eastern	39,000	.....	39,000	38,400
Florida	1,050	.....	1,050	1,050
Illinois	214,100	.....	214,100	210,500
Indiana	30,700	.....	30,700	30,200
Kansas	†307,400	.....	†307,400	†309,300
Kentucky	48,700	.....	48,700	48,400
Louisiana	977,200	133,600	1,110,800	1,110,825
North	106,200	5,100	111,300	111,325
South	871,000	128,500	999,500	999,500
Michigan	49,600	.....	49,600	51,000
Mississippi	141,200	3,700	144,900	144,900
Montana	86,000	.....	86,000	84,000
Nebraska	66,800	.....	66,800	67,700
Nevada	450	.....	450	450
New Mexico	291,800	6,800	298,600	298,600
North Dakota	58,900	.....	58,900	57,600
Oklahoma	†487,000	.....	†487,000	†501,600
Texas	2,333,000	89,600	2,422,600	2,422,600
Dist. 1	43,000	2,300	45,300	45,300
Dist. 2	99,000	8,100	107,100	107,100
Dist. 3	276,000	37,000	313,000	313,000
Dist. 4	175,000	12,500	187,500	187,500
Dist. 5	26,000	500	26,500	26,500
Dist. 6	106,000	8,200	114,200	114,200
East Texas field	128,000	.....	128,000	128,000
Dist. 7-B	121,000	250	121,250	121,250
Dist. 7-C	110,000	3,150	113,150	113,150
Dist. 8	970,000	12,000	982,000	982,000
Dist. 9	176,000	3,400	179,400	179,400
Dist. 10	103,000	2,200	105,200	105,200
Utah	77,000	.....	77,000	98,000
Wyoming	389,000	.....	389,000	390,100
Others	‡725	.....	‡725	‡725
Total U. S.	6,661,100	233,775	6,894,875	6,930,275
Change from previous week, down			35,400	
Canada	†602,500	.....	†602,500	†635,900
Total U. S. prod.—January 1-July 1			1,315,606,900 bbl.	
Same period last year (crude plus cond.)			*1,293,525,700 bbl.	

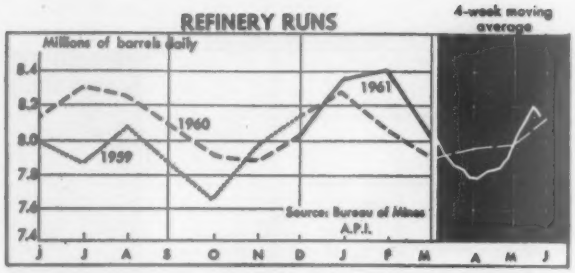
*Includes 42,244,200 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

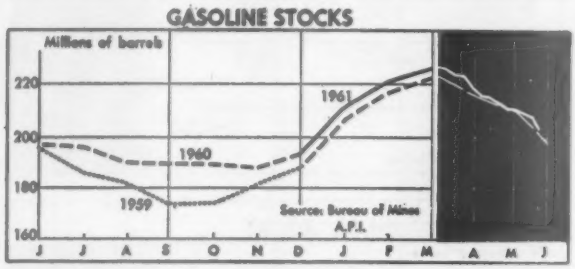
CRUDE-OIL PRODUCTION

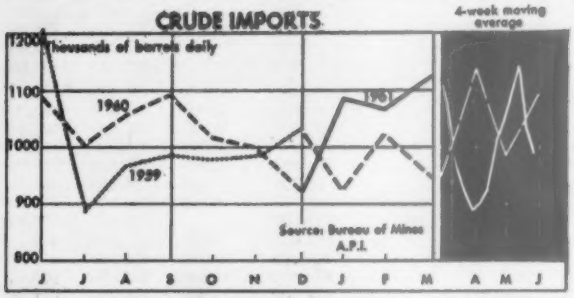


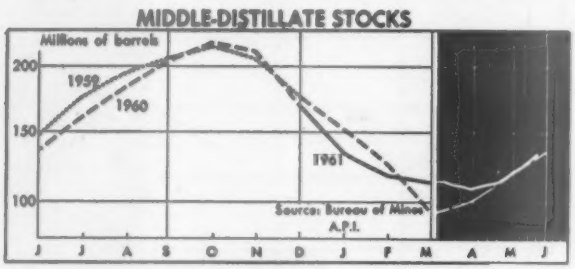
REFINING

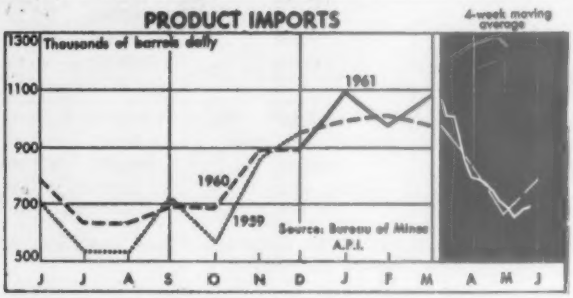


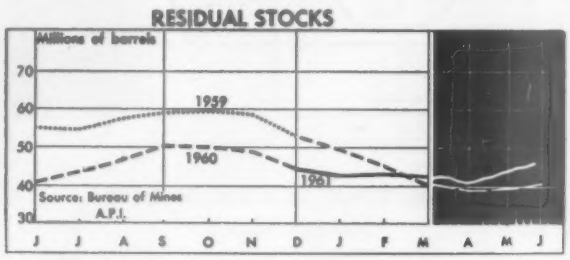












API REFINERY REPORT—JUNE 23, 1961 (DATA FOR JUNE 30 DELAYED BY HOLIDAY)

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, June 1960—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,007	446.4	38.7	266.0	123.1	46,359	11,009	31,562	10,543	1,128	528.9	34.2	325.7	146.4
Appalachian:														
District 1	102	44.9	2.0	24.9	8.3	5,848	591	2,343	374	96	41.2	2.7	21.7	7.7
District 2	89	38.1	4.3	9.4	10.7	2,823	353	971	196	90	46.6	2.1	16.3	8.5
Ind., Ill., Ky.	1,320	729.6	56.6	286.7	116.6	35,184	4,941	18,257	5,382	1,455	774.4	66.7	301.8	128.0
Minn., Wis., Dak.	129	61.8	4.4	33.6	19.6	7,106	817	4,355	713	128	62.3	5.3	32.8	14.6
Okla., Kans., Mo.	771	440.6	18.1	166.7	19.9	17,774	1,488	10,411	955	751	422.7	17.5	175.7	21.0
Inland Texas	322	222.7	13.7	57.0	19.9	7,418	556	1,570	2,662	304	223.5	10.0	49.8	22.4
Texas Gulf Coast	1,734	865.6	98.7	379.0	93.9	30,527	4,064	14,289	5,031	1,967	1,007.0	95.5	462.6	141.8
La. Gulf Coast	706	350.7	36.9	148.3	48.1	11,171	2,847	4,902	1,445	653	329.2	45.0	136.5	41.6
N. La. and Ark.	123	65.3	3.6	26.0	7.4	5,168	808	1,724	133	112	64.5	4.9	24.4	5.6
Rocky Mountain:														
New Mexico	21	11.0	0.4	3.7	2.1	581	56	177	38	24	13.2	0.3	4.3	2.2
Other Rocky Mt.	305	140.0	2.3	64.0	31.4	7,437	515	2,698	983	275	132.9	3.7	63.2	27.8
West Coast	1,236	479.7	45.4	220.3	269.7	26,003	1,535	12,697	17,636	1,143	513.7	37.4	163.2	275.7
June 23, 1961	7,865	3,896.4	325.1	1,703.6	770.7	203,399	29,580	105,956	46,091	8,126	4,160.1	325.3	1,778.0	843.3
June 16, 1961	8,224	4,387.7	330.7	1,820.7	832.0	207,682	29,211	102,666	45,175	.....	.....	.....	.....	.....
June 24, 1960	8,231	4,150.7	317.6	1,812.6	872.3	203,242	27,583	106,887	40,592	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

CRUDE-OIL PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (Inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Jules-burg	Wyo. (sour)
14-14.9	$1.86	....	....	....	....	....	....	....	....
15-15.9	1.93	....	....	....	....	....	....	....	$1.81
16-16.9	2.00	....	....	....	....	....	....	....	1.86
17-17.9	2.06	....	....	....	....	....	....	....	1.91
18-18.9	2.13	....	....	....	....	....	....	....	1.96
19-19.9	2.20	....	(†)	....	....	....	....	....	2.01
20-20.9	2.27	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague. †Two buyers announced increase.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.23-3.53
Van	3.08
Pennsylvania Grade:	
Bradford	$4.80
Middle District	4.52
Southwest Pennsylvania	4.25
West Virginia	4.17
Breckenridge	4.0
Illinois Basin	**3.00-3.05**

FOREIGN

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)	
Arabian, 34.0°-34.9°, Ras Tanura	$1.80
Iranian, 34.0°-34.9°, Bandar Mashur	1.78
Iranian, 34.0°-34.9°, Abadan	1.73
Iraq, 35.0°-35.9°, Fao	1.72
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.59
Qatar, 41.0°-41.9°, Umm said	1.95
Middle East, E. Mediterranean:	
Arabian, 34.0°-34.9, Sidon	$2.17
Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli	2.19
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 36°	2.42
Canada:	
Leduc-Woodbend	$2.53
Redwater (Alta.)	2.42
★ Weyburn (light)	2.085
★ Midale C	1.71
Venezuela:	
Cumarebo, 47°-47.9°, Tucupido	3.34
San Joaqin, 40°-40.9°, Puerto La Cruz	3.08
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

TANKER RATES (Long Ton)
(Latest reported spot fixtures)

★ Gulf-NY, clean (ATRS flat)	$2.85
★ Gulf-NY, dirty (ATRS—5%)	2.71
★ Carib.-NY, dirty (ATRS—50%)	1.38
★ Carib.-UK, dirty (Scale—60%) (13s. 0d.)	1.82
★ PG-Japan, dirty (USMC—75%)	2.55

★Denotes change from previous week.

REFINED PRODUCTS

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (91 octane)	12.25-12.50
Premium (99 octane)	15.00-15.25
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.75-11.00
Regular (92 octane)	11.00-11.25
Premium (98 octane)	12.00-12.25
California (rack) Los Angeles:	
Regular (90 octane)	11.60
Premium (94 octane)	12.60
Premium (100 octane)	14.10
Caribbean area (cargoes):	
Regular (87 octane)	9.125
Premium (97 octane)	11.50

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.50-9.75
Diesel oil (58 d.i. and above)	9.00-9.25
Distillate No. 1	9.00-9.25
Distillate No. 2	8.25-8.50
Gulf Coast (cargoes):	
Kerosine 41-43	9.00
Distillate No. 2	8.25
New York Harbor (barges):	
Kerosine 42-43	*11.40
Distillate No. 2	*10.40
Diesel fuel, 48-52 d.i.	*10.55
Caribbean area (cargoes):	
Distillate No. 2	8.625

*Subject to 0.5 cent discount.

RESIDUAL FUEL

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.65-1.75
Gulf Coast (cargoes):	
Bunker C fuel	2.20-2.30
New York Harbor (barges):	
Bunker C fuel	2.52
Caribbean (cargoes):	
Bunker C fuel	2.00
California (rack):	
Bunker C fuel, Los Angeles	2.25

Discovery Wells

(Continued from Page 180)

OKLAHOMA

Alfalfa County:

Olin Oil & Gas Co. 1 Gibson, C SE SE 33-24n-10w. IPP 16 BO and 5 BWPD, 38°, Chester 6,426-36 ft. TD 6,709 ft. PB 6,500 ft. New oil discovery.

Beaver County:

Russell Maguire 1-12 Blakemore, SE NW 12-4n-22eCM, 7 miles west of Beaver. IPF 156 BO, 6 hours, or 624 BOPD, ½-in. choke, FTP 1,000 psi., 41°, Marmaton lime 5,527-39 ft.; IPAOF 7,800 M.c.f.d., SIP 1,350 psi., Mississippian 6,603-12 ft. TD 6,910 ft. PB 6,650 ft. New oil discovery, dual completion.

Cimarron County:

Cities Service Petroleum Co. 1 Pinkerton "A," C NW NW 4-2n-8eCM, 2 miles south of South Keyes pool. IPFAOF 10,700 M.c.f.d., SIP 912, Morrow sand 4,446-52 ft. TD 5,170 ft. PB 4,482 ft. New gas discovery.

Garvin County:

Compadre Oil Corp. 1 Tomkins, 5 miles southwest of Pauls Valley in NE NE SE 27-3n-1w. IPF 72 BOPD, trace salt water, ¼-in. choke, FTP 200 psi., 36.5°, Layton sand 4,278-88 ft. TD 4,788 ft. PB 4,344 ft. New oil discovery.

Kingery Production Co. 1 Hurst, 2 miles west of Lewis pool in NW SE NW 36-3n-2e. IPP 45 BC and 10 BWPD, 29°, first Bromide sand 2,175-78 ft. TD 3,293 ft. Ne woil discovery.

Kingfisher County:

Champlin Oil & Refining Co. 1 Eugene Williams, 1 mile south of Columbia, SW SE 27-18n-5w. IPF 28 BOPD, ½-in. casing choke from Oswego 6,118-36 and open hole 6,471-6,548 ft., FCP 25, IPF 7 BOPD, ¾-in. choke on time intermitter from Meramec. TD 6,548 ft. New oil discovery, dual completion.

Major County:

Livingston Oil Co. 1 Scannell-Garnett, 10 miles northeast of Fairview, C NW NE 33-22n-11w. IPF 192 BOPD and 155 M.c.f.d., 32/64-in. choke, Manning, FCP 1,000 psi., SICP 2,000 psi., GOR 807:1, IPCOF 1,500 M.c.f.d., Meramec, SITP 2,100 psi. 6,902-50 and 7,152-96 ft., Manning and Meramec. TD 7,244 ft. New oil discovery, dual completion.

Union Texas Natural Gas Corp. 1 Glidewell, 2½ miles southwest of West Forrest Home field. SE SE NW 30-22n-11w. IPF 320 BOPD, 22/64-in. choke, Manning 6,766-6,828 and 7,063-80 ft. Also from Meramec. FTP 90 psi., GOR 1,317:1, 37°, IPF 8,800 M.c.f.d. and some condensate from Meramec, 24/64-in. choke, FCP 950 psi., SICP 1,300 psi. TD 7,965 ft. New oil and gas discovery.

Pottawatomie County:

Fain-Porter Drilling Corp. 1 Charles Gish, 1¼ miles east of Burnett field in NE SW NE 27-8n-2e. IPF 184 BOPD, 18/64-in. choke, FTP 60 psi., 60° Chimney Hill lime 5,334-42 ft. TD 5,865 ft. PB 5,600 ft. New oil discovery.

Pushmataha County:

J. T. Stephenson & King-Stevenson Oil Co., Inc. 1 Brame, 3 miles southeast of Miller in C NW SE 15-3s-15e. IPF 500 M.c.f.d., open tubing and 1 BLOPD 2⅞-in. tubing, Stanley shale 3,062-5,150 and open hole 5,240-5,640 ft. TD 8,371 ft. PB 5,640 ft. New gas discovery in Ouachita Mountains.

Woodward County:

Hefner Producing Co. 1 Morehart, C NW SE 31-23n-22w, 3 miles west of Tangier. IPCAOF 6,940 M.c.f.d., 6 BCP million, lower Morrow sand 8,309-68 ft. TD 8,682 ft. PB 8,462 ft. New gas-condensate discovery.

NORTH TEXAS

Archer County:

Gulf Oil Corp. 1 Lula G. Williams, 1 mile south of S.G.S. field, James Saunders Sur., A-644. IPF 199 BOPD, 14/64-in. choke, TP 960-210 psi., CP 1,050-610 psi., 45°, GOR 244:1, Miss. 5,274-5,377 ft. TD 5,435 ft. PB 5,412 ft. New oil discovery.

Baylor County:

Burk Royalty Co. 1 Elledge-Furr unit, Sec. 2848, TE&L Sur., A-498. IPF 125 BOPD, 14/64-in. choke, 41°, GOR 600:1, TP 200 psi., CP 500 psi. Miss. lime open hole 5,350 ft. TD 5,394 ft. New oil discovery.

Grayson County:

Handy "D" Strawn sand field. Texaco Inc. 12 Handy unit, 9 miles northwest of Gordonville in Samuel Stewart Sur., A-1069. IPP 15 BOPD plus 80% water, 35°, Strawn sand 1,552-78 and 1,600-7 ft. TD 3,060 ft. PB 1,628 ft. New discovery.

Jack County:

Ada Strawn Lower Buttram field:

Ada Oil Co. 3 Richardson Heirs, 6 miles southeast of Antelope in M. J. Harley Sur., A-2198. IPP 144 BOPD, 38°, GOR 200:1, lower Buttram sand 2,946-54 ft. New oil discovery.

Leatherwood Drilling Co. 1 Patton-Johnson unit, 1¼ miles southwest of East Perrin field. Sec. 1, SPRR Sur., A-567. IPAOF 3,600 M.c.f.d., SITP 1,155 psi., GLR 155,000:1, 39.3°, Caddo conglomerate 4,303-6 and 3,308-16, 4,320-26 ft. TD 5,410 ft. Gas-condensate discovery.

Montague County:

Clyde J. Brannan, Jr., 1 Paula Boedecker Clar, 2 miles northwest of production, 6 miles west of Bowie in Sec. 2878, TE&L Sur., A-796. IPF 162 BOPD, 16/64-in. choke, TP 820 psi., packer, 44°, GOR 1,431:1, Viola lime 6,686-6,704 ft. TD 7,021 ft. New oil discovery.

SOUTH TEXAS

Bee County:

Humble Oil & Refining Co. 2 Laura T. Barrow, 7 miles northeast of Papalote in Pat Downey Sur., A-20. IPAOF 13,300 M.c.f.d., SICP 2,081 psi., 62.7°, GLR 85,800:1, BHPSI 2,443 psi., 5,600 ft. Frio sand, 5,634-38 ft. TD 6,176 ft. New gas-condensate discovery.

Calhoun County:

Sun Oil Co. 192-1 Espiritu-State, 22 miles southeast of Port Lavaca in St. Tr. 192, Espiritu Santo Bay. IPAOF 15,300 M.c.f.d., SITP 3,230 psi., lower tubing 6,162-88 ft.; IPAOF 10 M.M.c.f.d., SITP 848 psi., upper tubing 1,858-66 ft. TD 6,303 ft. Dual gas discovery.

Duval County:

West A&H Hockley field. L. B. Horn & D. W. Dassow 2-A Isabel De Garcia, 10 miles north of San Diego in Sec. 411, AB&M Sur., A-38. IPF 93 BOPD, no water, 12/64-in. choke, TP 200 psi., 45°, GOR 600:1. Hockley 4,155-57 ft. TD 4,350 ft. New oil discovery.

Goliad County:

Cosden Petroleum Corp. 1 S. E. Crews III, 5 miles northwest of Goliad in Maria Jesusa de Leon Grant, A-22. IPF 9,200 M.c.f.d., SITP 4,653 psi., 52°, GLR 66 bbl. per million, Wilcox 9,926-37 ft. New gas-condensate discovery.

West Clip. Lyda Hunt-Herbert Trusts 3 R. M. Lucas, 3 miles northeast of Berclair in A. McKinney Sur., A-218. IPAOF 22,200 M.c.f.d., SICP 1,224 psi., BHPSI 1,304 psi., dry gas, 2,800-ft. Frio sand 2,824-28 ft. New gas discovery.

Forrest C. Lattner 1 Ella Fimble, 7 miles northwest of Goliad in Jacob Fifer Sur., A-120. IPAOF 42 M.M.c.f.d., SITP 1,063 psi., BHPSI 1,131 psi., dry gas, 2,500-ft. Frio sand 2,544-46 ft. TD 9,226 ft. New gas discovery.

Hidalgo County:

Plymouth Oil Co. 1 D. J. Schwarz, 2 miles northeast of Progreso in Sh. 5, Llano Grande Grt. IPFAOF 5,200 M.c.f.d., SITP 3,607 psi., BHSIP 4,380 psi., 51.4°, GLR 488,000:1, 8,500-ft. sand 8,545-54 ft. TD 9,524 ft. New gas-condensate discovery.

LaSalle County

East Washburn. C. L. Buss Morgan 1-42 South Texas Syndicate, 14 miles southeast of Los Angeles, Texas, Sec. 42, H&GN Sur., A-1391. IPF 112 BOPD, no water, 11/64-in. choke, TP 195 psi., 40.4°, GOR 1,038:1, Wilcox 4,862-66½ ft. TD 5,642 ft. New oil discovery.

Live Oak County:

Austral Oil Co., Inc., 1 Ralph S. Jackson, 5 miles southwest of Dinero in Wm. Primm Sur., A-317. IPF 126 BOPD, no water, 9/64-in. choke, TP 825 psi., 47.8°, GIR 1,715:1, Lower tubing Pettus 5,124-31 ft.; IPF 116 BOPD, no water, 14/64-in. choke, TP 405 psi., 48.8°, GOR 3,010.1, Upper tubing Hockley 4,377-87 ft. TD 6,024 ft. Dual oil discovery.

Southwest Ramirena area. Humble 28 Mary A. Reynolds, 5 miles southwest of Lagarto in Wm. H. Moore Sur., A-284. IPF 116 BOPD, plus 27% b.s. and w., ½-in. choke CP 70 psi., 44.6, GOR 733:1, 3,850-ft. Segment "E" sand 3,841-44 ft.; IPF 100 BOPD, trace water, 12/64-in. choke, CP 250 psi., 47.1°, GOR 932:1, S-2 3,900-ft. Segment "E" sand 3,919-22 ft. TD 5,507 ft. New dual oil discovery.

Zavala County:

W. J. Steeger et al. 1 Cross "S" Ranch Inc., 7 miles north of Crystal City in Sec. 12, Cross "S" Ranch Subd. of Pedro Jose de Aguirre Grant. IPF 9 M.M.c.f.d., SICP 1,005 psi., dry gas, Olmos 2,667-74½ and 2,680-86 ft.; IPF 12,500 M.c.f.d., SITP 1,389 psi., dry gas, San Miguel 3,340-54 ft. TD 3,652 ft. Dual gas discovery.

TEXAS GULF COAST

Jefferson County:

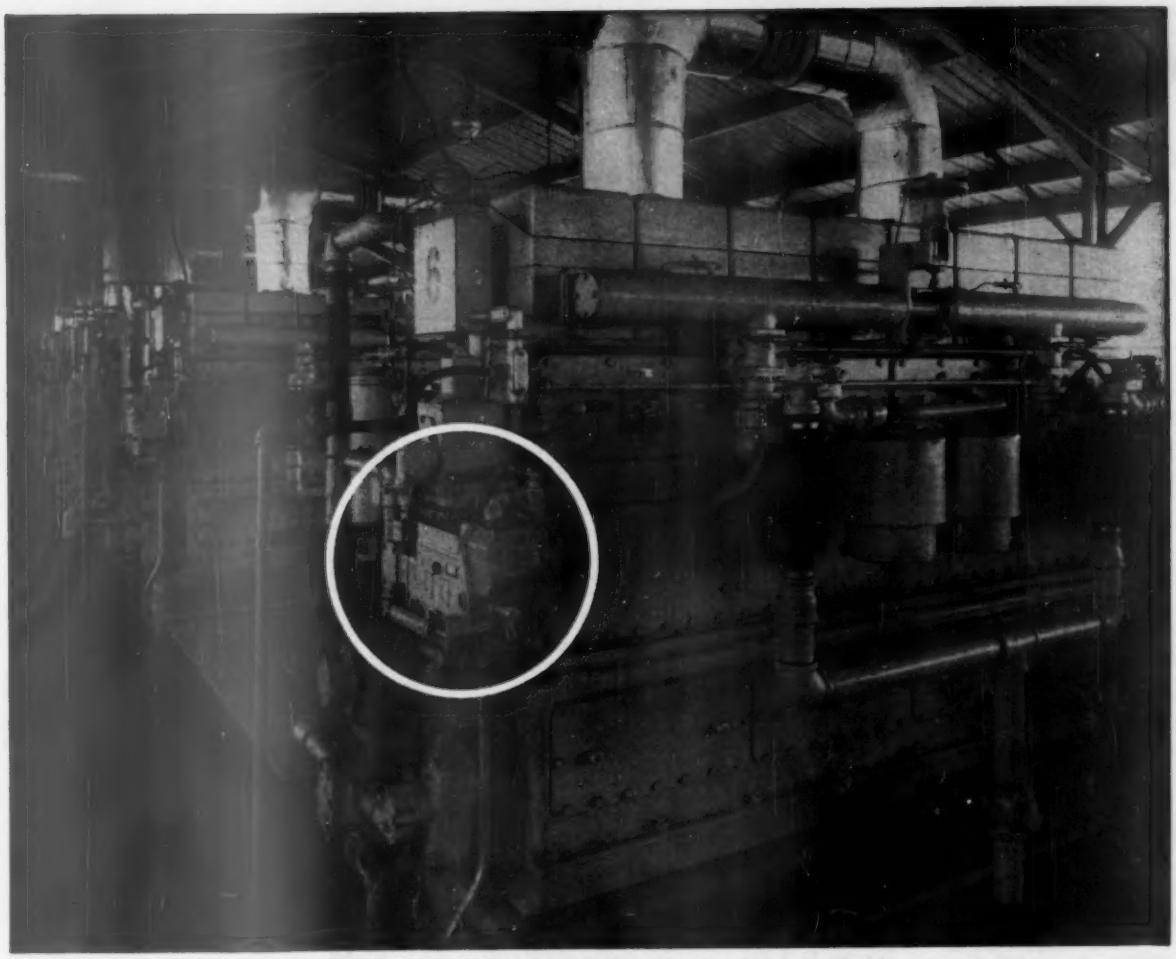
Southwest Port Acres field. J. P. Owen 1 H. M. Rosen et al. Un., 1.2 miles southwest of Port Acres, BBB&C RR Sur. 385, A-84., Port Acres Subd. Blk. 19, Blk. 2. IPF 120 BOPD, 7/64-in. choke, TP 2,000 psi., GOR 3,333:1, 39°, Frio 10,637-42 to 10,664 ft. TD 11,629 ft. New oil discovery.

Orange County:

Cla-Lin (Proposed). Texas Gulf Producing Co. 2 Claybar-Lindsey, 3 miles southwest of Hartburg in Eugene Wood GC&SF Sur. 10, A-477. IPF 360 M.M.c.f.d., SIGP 4,823 psi., BHSIP 5,746 psi., GLR 32,200:1, 51.3°, Morgan "B" sand 7,811-17 ft. TD 8,600 ft. New gas-condensate discovery.

Tyler County:

Peavy, J. P. Owen et al. 1 S. H. Crosby et al., 5 miles north of Village Mills in V. A. Petty Sur., A-1056. IPAOF 1,600 M.c.f.d., SITP 2,553 psi., BHSIP 3,552 psi., GLR 13,240:1, 59.8°, Wilcox 8,250-ft. sand, 8,261-66 ft. TD 10,410 ft. New gas-condensate discovery.



Circle indicates Bendix LC magneto on White Superior engine at Long Beach.

BENDIX LC MAGNETOS HELP POWER GIANT LONG BEACH WATER-FLOODING PLANT

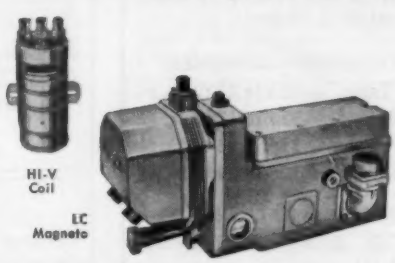
Long Beach, California, operates what may become the world's largest water-flooding plant—drawing water from the Pacific Ocean and pumping it into the Wilmington Tract beneath the city. The additional pressure created will aid in oil recovery and, it is hoped, will reduce land subsidence in the area.

Currently operating at a rate of 120,000 barrels per day, the capacity will be increased and may eventually reach 1,000,000 barrels per day—which would make it the world's largest project of its kind.

The plant is powered by eight White Superior gas engines equipped with Bendix* LC magnetos and HI-V transformer coils. These matched ignition systems, noted for long service life, simplified maintenance at low cost and complete operating reliability, can be used with engines of from six to sixteen cylinders.

If you want to know why major operators are specifying Bendix LC Ignition, write SCINTILLA DIVISION, THE BENDIX CORPORATION, SIDNEY, NEW YORK.

*REG. U.S. PAT. OFF.



MATCHED IGNITION SYSTEM

Export Sales and Service: Bendix International Division, 205 E. 42nd St., New York 17, N. Y. *Canadian Affiliate:* Aviation Electric Ltd., 200 Laurentien Blvd., Montreal 9, Quebec. *Factory Branch Offices:* Burbank, Cal.; Orlando, Fla.; Chicago, Ill.; Teaneck, N. J.; Dallas, Tex.; Seattle, Washington; Washington, D. C.

Scintilla Division
SIDNEY, N. Y.

The Bendix Corporation

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FOR SALE EQUIPMENT

FOR SALE—Lufkin pumping unit, Type SO-36, Gear Ratio 9.94-1, Serial #26-U, 41.4 H.P., Twin crank 204,930# Peak Torque, 25,000# Beam Capacity 74" stroke floor clearing sub-structure. This unit is new and has never been used. Contact: Overton Supply Company, Overton, Texas

Buying
Good Used Equipment
is frequently the difference between having needed equipment or doing without it.

LIQUIDATION
at ESSO REFINERY Balto., Md.

MOST EQUIPMENT NEW 1956

TOWERS—30" to 84" diameter, 20' to 97' high, 7 to 34 trays, up to 360 PSI

DRUMS—3' to 12' diameter, 12' to 45' long to 530 PSI, some lined—some NEW

PETRO-CHEM FURNACES—30.7; 19.3; 10.4; 9.7; 7.5; 2MM BTU/Hr.

NEW FURNACE TUBES—4000'—⅜" & ½" Wall Croloy 5—4" to 6"

PUMPS—88 to 400 GPM up to 2040' head—up to 8 Stage

HEAT EXCHANGERS—CONDENSERS

Stainless Tubes	—235 to 2320 Sq. Ft.
Croloy 5 Tubes	—573 to 1040 Sq. Ft.
Admiralty Tubes	—216 to 1640 Sq. Ft.
Steel Tubes	—238 to 2240 Sq. Ft.

COMPRESSORS & BLOWERS

510CFM @ 500PSI Non-Lubricated 350 HP (3)
7500CFM @ 42.5PSIG, 1250HP Synch.

WRITE FOR CATALOG

HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N. Y.
310 Thompson Bldg., Tulsa, Okla.
Boston & Haven St., Baltimore 24, Md.

FOR SALE EQUIPMENT

USED QUICK-CYCLE hydrocarbon Recovery and Gas Dehydration Units: 12MM to 30 MM SCFD capacities at 1000# W.P.—turnkey installation. Other used gas processing equipment available including gas dehyrators, glycol type. Two Used 10' x 22½' x 50# W.P. Emulsion Treaters with New 1.0 MM BTU/Hr. Firetubes and New Valves and Accessories. Engineered Specialties Co., Box 35683, Phone FL 1-5284, Dallas 35, Texas.

WORTHINGTON LT-6
1000HP, 400RPM, 15 x 15, NAT. GAS
5000GPM—640 ft. HD. Pumps, 12UZD-1
REASONABLE PRICE—EL DORADO, ARK.
S. M. DAVIS
Box 1407, E. St. Louis, Ill.

SURPLUS PIPE FOR SALE
2900' 2⅞" Amer Open Hole Drill Pipe W/ 3⅞" Bottle Neck T. J. Inspected. 3500' 3½" I.F. Inspected W/ 4⅞" T. J. Square Shoulder. 11,000' 3½" I.F. Inspected W/ 4½" T. J. Bottle Neck. 4000' 4½" FULL & X Hole Inspected W/ 5⅞" T. J. Bargain Priced.
Write or Call
Don Harman Pipe Supply
Phone OR 7-4343 Oklahoma City, Okla.

AT N. LITTLE ROCK, ARKANSAS
3—Worthington #LTC-4 compressors. 3500 CFM @ 45 PSI, 24 x 18, 2-cyl., 500 HP, 4-cycle, gas-engine drive.
Phone POplar 3-3565
PERRY EQUIPMENT CORP.
1402 N. Sixth St.
Philadelphia 22, Pa.

USED WATER INJECTION EQUIPMENT
Aldrich Triplex, 2" x 5" pump, 120 HP, skidmounted with Waukesha Model WAK 165 HP gas engine, complete with belts and accessories.
NATIONAL Size 10' x 7' 6" vertical water accumulator and Size 10' x 5' backwash filter tank.
PETROLEUM MANAGEMENT, INC.
402 Wilson Tower
Corpus Christi, Texas

FOR SALE
2,500 BBL. OIL REFINERY
Located Near Escanaba, Michigan
Unrestricted supply of western Canadian Crude Oil from Lakehead Pipeline. 25 acre site. 100,000 bbl. Storage Facility, Fractionating Tower, Naptha Tower, Asphalt Tower, Exchangers, Pumps, Piping, etc. Plant processed Gasoline and Fuel Oils. Facilities available for production of Asphalt, Naptha, Jet Fuel, etc.
VERY ATTRACTIVELY PRICED
Box M-454, The Oil and Gas Journal
Tulsa, Oklahoma

FOR SALE EQUIPMENT

FRED E. COOPER deep-hole workover unit, complete with Lee 87' telescoping derrick, 187,000 lb. hook load, hydraulic tongs and air slips. Practically new. One Bucyrus-Erie 48L spudder, complete with rod and tubing tools. Write: G. H. Turpin, 306 Austin, Borger, Texas—or phone: BR 3-5551.

WEST VIRGINIA, Ohio, Penn., Michigan operations: Have 80 Keystone 5,000 feet rig for all practical purposes, like new; has 4,500 ft. nearly new line. Axle and hitch for moving. Give away price of $5,000.00.—Also have D7 Caterpillar tractor 12 ft. blade, winch, and TD14 International tractor with 12 ft. blade and winch. These will be good for building roads and pulling rigs up hills. $4,900 and $3,900 price. Harold Hardwick, Burnside, Ky.

LIQUIDATION
at WHITING, IND.

Modern 15,000 BSD Fixed Bed HYDROFORMER

Must Remove At Once Will Be Sold As Units Or Piecemeal

3—Steam Driven GAS COMPRESSORS
2495 CFM 205 PSI Discharge
3—Steam Driven
RECYCLE GAS COMPRESSORS
11840 CFM 325 PSI Discharge
1—Electric Driven AIR COMPRESSOR
2760 CFM 325 PSI Discharge 800 HP

DRUMS
8' x 30' 222 PSI Design
6' x 15' 342 PSI Design
6' x 22' 1260 PSI Design

TOWERS
8' x 63'—18 tray 390 PSI
7' x 83'—30 tray 342 PSI
4' x 83'—34 tray 222 PSI

PUMPS—EXCHANGERS VESSELS

Write for Inventory
Send Us Your Requirements

HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N. Y.
310 Thompson Bldg., Tulsa, Okla.

FOR SALE EQUIPMENT

DRILLING RIG for sale to highest bidder, Unit Rig U-15 with Hydromatic brake and feed control, 127 foot Lee C. Moore Cantilever Mast, 4" O.D. drill pipe, etc. Inventory list will be mailed together with bidding instructions upon request. All bids must be post marked not later than July 17, 1961. Shell Oil Company, P. O. Box 1500, Midland, Texas, Attn: Mr. J. W. Benn.

50,000 ft. 20" No. 1 grade used pipe.
Lengths 20 ft. square cut ends.
Weight 78# to the ft.
High Tensile Pipe.

Indiana-Ohio Pipe Co.
P. O. Box 5462 Shep. Sta.
Columbus 19, Ohio
Phone CL 3-5527—CL 3-5528

LIQUIDATION

at TORRANCE, CAL.

CAT REFORMER
NEW 1954

To be Sold Piecemeal at Tremendous Savings

MUST BE OUT IN 120 DAYS

13'x112'6"x5/16" TOWER, 250 PSI @ 650°F
23 Bubble Cap Trays
12'6"x98'x1 1/2" REACTOR, 218 PSI @ 850°F
30"x52'9" TOWER 250 PSI 30 Bubble Trays
13'5"x19'6"x1 1/2" HOPPER
16'x150' CATALYST STORAGE BINS (3)
7'x44'6"x1 1/16" DRUM 255 PSI @ 650°F
9'x136"x1" DRUM baffled 174 PSI @ 375°F
48"x11'x 15/16" DRUM 375 PSI
5'x29'x 7/16" DRUM 100 PSI @ 650°F
5'x17'8"x 5/16" DRUM
25000 CF HORTON SPHERE GAS HOLDER
12' PRESSURE SPHERE 220 PSI @ 850°F
12' PRESSURE SPHERE 330 PSI @ 650°F
70 MM BTU/HR. Horizontal HEATERS (2)
5' ODx17'6" OA AIR HEATER
197 Sq. ft. Petro-Chem INERT GAS GENERATOR
Compressed GAS DRYER Kemp Model 505
400 Sq. ft. U.S. Auto-Jet FILTERS (2)
63800#/hr. Deaerating Feedwater HEATER
26"x69" ENTRAINMENT SEPARATOR 600 PSI
2'4"x19'5"x 3/8" ELUTRIATOR
Buell #10A2 CYCLONES (7)
221' c/c Hot Catalyst ELEVATOR 30" Buckets

HEAT EXCHANGERS—600 to 4250 Sq. Ft.
Chrome, Admiralty, Steel Tubes
100 to 1000 PSI

PUMPS

1800GPM @ 141' Pacific 8" Type DC 100 HP (2)
2325GPM @ 272' Worth 6HD3 Chr Trim (2)
450GPM @ 1160' Pacific 3" Type J 3 Stg (4)
506GPM @ 311' Pacific 4" Type SVS
315GPM @ 1115' Worth 3UQ2 4 Stg Chr Trim

COMPRESSORS

4840 CFM Carrier, Centrifugal 8100 RPM, 149.7 PSIA Suction, 239.7 PSIA Discharge Driven by 2066 HP Terry Condensing Turbine, 430 PSI @ 560°F. (2 Units)
604 Ton Carrier, Freon 11 Refrigeration with Condenser & Cooler driven by 639 HP Terry Condensing Turbine, 430 PSI.

Write for Inventory
Send Us Your Requirements

HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N. Y.
310 Thompson Bldg., Tulsa, Okla.

FOR SALE EQUIPMENT

PUBLIC AUCTION

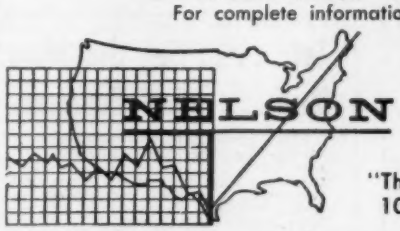
Tuesday, July 18th, 10:00 A.M.

O. L. HENSON DRILLING COMPANY
279 Ruidosa, Abilene, Texas

Mr. O. L. Henson is quitting his Texas contracting business and has commissioned NELSON AUCTION SERVICE to sell all of his equipment located at the Abilene yard WITHOUT MINIMUM OR RESERVATION.

3 COMPLETE ROTARY RIGS
And Many Other Related Items

FREE BAR-B-QUE WILL BE SERVED
For complete information write or call . . .



AUCTION SERVICE
"The Sellin'est Team in the Nation"
107 E. 16th—Amarillo—DR 2-9513

FAILING 1500, truck mounted, complete with air compressor and service truck. Also, Star 45 spudder, rated 4500'. Prices right. Pressey & Son. Pueblo, Colorado.

FOR SALE: 2 Franks double drum units with Spudding attachments. All tools complete. Phone after 5:00 p.m. 1171. Jack Ekas, 110 W. Strothers, Seminole, Okla.

BUCYRUS ERIE 22-W Spudder, mounted on 1955 Chevrolet truck with drilling and sand lines, rig completely overhauled. Kent Well Servicing Co., Inc. Phone: DA 1-9440 El Dorado, Kansas.

FOR SALE—Two Walker-Neer rigs and miscellaneous cable drilling tools. Contact E. E. Reed Drilling Company, P. O. Box 306, Phone Niagara 9-3451, Satanta, Kansas.

FOR SALE: Perforating Trucks with Logging Equipment. Will Sacrifice! All Offers Considered. Box M-467, The Oil and Gas Journal, Tulsa, Oklahoma.

AN INVESTMENT! Productive advertising is an investment rather than an expenditure. Experienced oil men have found that The Oil and Gas Journal is their best classified advertising medium.

1500 FAILING, long mast kelly, compressor, 1500' drill pipe, complete, $7,750.00. Failing 2500 58' mast, 5 x 8 pump, sell, trade, rent. Box M-472, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

2—Beaird Packaged Compressor Units 660 HP
1—Clark Compressor, 800 BHP, Model RA-8
1—Petro Chem Furnace, 1 MM BTU, New
1—U. S. Auto Jet Filter, 200 sq. ft. S/S

SNOW EQUIPMENT CO.
1700 Holcombe Blvd., Houston 25, Texas
JA 2-0359

EQUIPMENT WANTED

72 AND 71 Speedstars, 24 Bucyrus Spudders. Also 2⅞" and 2⅜" by 10' and 20' long drill pipe. Will buy outright or trade. Have two rebuilt 1000 Mayhew rotaries and other machines. Star Drilling Supply Co., Phone HE 1-3470, Chanute, Kansas.

We will buy Plants for dismantling. Any size or location.
Let us bid on your next offering for part or complete Plant, Refinery or Equipment.
References furnished upon request.

STAR WRECKING COMPANY, INC.
21545 N. Telegraph Rd.
Southfield, Michigan
KEnwood 7-2500

HELP WANTED

OIL JOB DIRECTORY, foreign and domestic, showing where to apply for jobs. $5.00 cash OIML Co., Box 2003, Tulsa, Oklahoma.

LARGE INDEPENDENT producing company needs petroleum engineers for drilling and completion, workovers, and secondary recovery operations, in district offices. Positions open in Texas, Louisiana and North Dakota. Should have three to six years experience. Starting salary commensurate with experience and ability. Send complete resume of education and experience and recent photograph to Box 1262, Dallas, Texas.

CHEMIST

Oil Well Chemicals

Graduates with minimum of two years' experience with oil well treating chemicals such as emulsion breakers, paraffin solvents, corrosion inhibitors and water system treating.
Excellent opportunity to grow with newly created department of national oil well service company. Benefits include insurance, retirement, and profit-sharing. Send resume of experience and personal history to: Box M-481, The Oil and Gas Journal, Tulsa, Oklahoma.

RESEARCH & DEVELOPMENT ADMINISTRATOR

ENGINEER

with research technology, organic chemistry technology, practical application engineering, patent, supervisory experience.
May be Chemical, Petroleum or Mechanical Engineer
or
Chemist, Physicist or other Practical Scientist
with degree or equivalent research and development experience.

The right man will have a unique opportunity for a rewarding career with a growing company which is making basic contributions in research, engineering, and secondary oil production.

If you feel that you have any combination of talents which may fit you for this position, please send us full information about yourself. You have our explicit promise that your identity will not be disclosed unless we have first asked and received your permission. Our people know of this advertisement. Box M-479, The Oil and Gas Journal Tulsa, Oklahoma.

HELP WANTED

PROCESS ENGINEER. Experienced in Petrochemicals, Alkylation, Cat-reforming, Cat-cracking and other refining units. Refinery located in Midwest. Box M-468, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER for sales work. Houston Manufacturer of gas lift and oilfield production equipment. Give resume of experience. Our employees know of this ad. Box M-418, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER

Petroleum refinery process engineer with minimum of three years experience. Ability to evaluate raw charge feed stocks and blend finished products. Salary open with excellent fringe benefits. Long established independent refinery located in major center of Louisiana. Our employees know of this ad. Submit complete resume of experience, education and salary requirements. Write:

Box M-462, The Oil and Gas Journal
Tulsa, Oklahoma

PROCESS ENGINEER

Mid-West Refinery has opening for experienced Process Engineer. Must be a graduate engineer, preferably Chemical, and have background in practical and technical aspects of petroleum refining. Here is an opportunity with a growing company. Submit complete resume of experience, education, and salary expected. Reply to:

DERBY REFINING COMPANY
Division of Colorado Oil & Gas Corp.
Attn.: E. R. Jones, V.P. of Manufacturing
P. O. Box 1030, Wichita, Kansas

GULF COAST EXPLORATION MANAGER

Leading Integrated Independent Oil Company looking for Experienced, Aggressive, Imaginative Gulf Coast Exploration Manager. Geologic and Management Experience necessary. Louisiana background desirable. Age 35 to 50 preferred. All replies held in strict confidence.

Send complete resume including salary requirements to:

Box 31 Q 45
The Oil and Gas Journal
4041 Marlton Ave.,
Los Angeles 8, California

HELP WANTED

NATURAL GAS Engineer with engineering degree plus 3 to 5 years experince in plant design or operation for work in the Gulf Coast Area. Amerada Petroleum Corp., Gas Department, P. O. Box 2040, Tulsa, Oklahoma.

GAS PLANT Superintendent, experienced engineer needed for 375 MMCFD gasoline plant to be constructed in Florida. Successful applicant must have 10 years experience. Engineering degree is preferred. Send resume in confidence to Mr. North, Coastal Transmission Corporation, 520 Bank of Commerce Building, Houston 2, Texas.

COMPUTER ENGINEER experienced in petroleum refining economics and capable of directing operations of a computer section. Position is in the Manufacturing Department of a major integrated company located in the Mid-West. Send complete resume to Box M-474, The Oil and Gas Journal, Tulsa, Oklahoma.

1st . . . . . Get the Man
2nd . . . . Call Burnham

Start your new man off with a worry-free move to his new job, his new city. The sooner he is settled, the sooner he will perform the job for which he was hired. Burnham Van provides a Personalized Moving Plan for employees that helps eliminate 50% of the problems of a new man in a new city. A sample packet of the Personalized Moving Plan is available upon request. You'll like the way it babies your new people. Write to Chuck Swann, Burnham Van Service, 1632 Second Avenue, Columbus, Georgia.

PLANT SUPERINTENDENT

For medium sized low temperature absorption type gasoline plant located near Houma, Louisiana. Must have experience in plant operations and maintenance. Previous experience as a Superintendent desirable. Send complete resume, including salary expected to:

PLACID OIL COMPANY
418 Market Street
Shreveport, Louisiana

TENNESSEE OVERSEAS COMPANY
has an opening for a

PRODUCTION OFFICE SUPERVISOR

for its Foreign Operations

Must have 5 to 10 years field-office administrative and clerical experience in oil production and exploration operations. College degree, knowledge of Spanish, and foreign experience preferred. Excellent benefits and opportunity. Send detailed description of experience, education, and family status to:

Employment Office
Tennessee Gas Transmission Co.
P. O. Box 2511
Houston 1, Texas

(All replies will be held in confidence)

SITUATIONS WANTED

LANDMAN, GRADUATE B.S., 33, married, 4 years experience Landman work, pooling, unitization, desires position offering challenge and responsibility. Box M-478, The Oil and Gas Journal, Tulsa 1, Oklahoma.

ENGINEER—MANAGER: age 51, family, retired inadequate pension, 21 years foreign service major oil company. Diversified experience: field, refinery construction and maintenance, chief engineer and consultant marketing operations. Knowledge Spanish. Desires position administrative or representative. U. S. or foreign. Box M-484, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING OR PETROLEUM Engineer: 11 years varied domestic and foreign experience in engineering, as a toolpusher, and supervisor. Two degrees in engineering. Speak fluent Spanish. Desire domestic or foreign employment. Box M-483, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, Ten years diversifield experience in drilling, completion, workovers, water flooding, gas injection, writing reports and recommendations, evaluations. Box M-470, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—Production manager, seventeen years experience drilling, production, oil and gas property evaluation, reservoir engineering, administration and management. B.S. degree Petroleum Engineering, LL.B degree Law. Complete resume on request. Box M-466, The Oil and Gas Journal, Tulsa, Oklahoma.

MONEY RAISING

WANTED—CAPITAL to help develop a 25 million dollar placer gold mine. Qualified Engineer's report available to interested parties. C. L. Craig, Box 790, Plainview, Tex.

BUSINESS OPPORTUNITIES

WANTED, Investors to operate in the heart of West Virginia's Gas Producing Area. Lewis, Gilmer and Braxton Counties or will farm out Leases in 100 to 500 Acre Blocks. CONTACT, M. J. Moran, Box 368, Weston, W. Va., telephone 828 or 1149.

FINANCIAL—Investment Banking Houses and Underwriters reached. Confidential. You can send the details of your proposition direct or thru your attorney to Consultant 817—51st Street, Brooklyn, N. Y.

FOR SALE: Drilling Contracting Business, South Texas. Four medium depth drilling rigs, equity in three producing leases. $500,000 net operating loss carryover available. Address inquiries to:

Box M-480, The Oil and Gas Journal
Tulsa, Oklahoma

ROYALTIES

MID STATES Oil & Gas Brokers, Phone Ex. 3-7206, Room 7, Chamber Commerce Bldg., Olney, Illinois. Specialies in selling oil and gas properties. List with us for FAST service on Buying or selling oil or gas properties.

BUSINESS SERVICE

COMPLETE LEASE and title service. J. A. Buchanan, P. O. Box 1344, 313 Peoples National Bank Bldg., Tyler, Texas.

DELAWARE CORPORATION formed and serviced American Guaranty & Trust Company. P. O. Box 487, Wilmington, Delaware.

NEED ESTIMATING HELP?

If you are estimating a Refinery, Chemical Plant or other type of industrial project and need help

Write or Phone
RICHARDSON ENGINEERING SERVICES
BOX 927 DOWNEY, CALIFORNIA
TELEPHONE TOPAZ 1-5022

PRODUCTION WANTED

WE WANT TO BUY MINIMUM 100 BARRELS OIL PRODUCTION PER DAY

Minimum 50,000 barrels remaining primary reserve; complete well history must be furnished together with all available engineering data. Reply Sage Oil Company, 200 Centennial Building, Denver 2, Colo.

LEASE AND DRILLING BLOCKS

JEFF DAVIS County, Texas. 40 acres, Sec. 10, Block 2. Surrounded by 13 major companies. Write F. G. Jordan, Apt. 118, 3943 W. Diversey, Chicago 47, Ill.

SOUTHERN CASEY County, Kentucky: 800 acres in trend east side. Goose Creek fault one mile east and southeast from New Knox oil field. Price $30.00 per acre. Inspection invited. Write—Wire—Phone W. V. Cravens, Russel Springs, Kentucky.

200 ACRES Near Production on Stratton Ridge, Brazoria County, Texas. Brokers invited. Wallace Miller, 2812 Glendale Blvd., Los Angeles 39, Calif. NOrmandy 4-1913.

OIL AND GAS Lease Available, Sections 561 also 621, John H. Gibson Survey, Block D. Yoakum County, Texas. L. J. Luedecke, 1715 Cromwell Hill, Austin, Texas.

SOUTHWEST CRANE County, Texas: Oil and gas lease, five years primary term, S/239 acres, section 18, Block B-28, PSL survey, 2 miles from new oil gulf devonian shows in sec. 15, Blk. B-28, PSL, Ward County, Texas. Great potential bargain. Write landowner: Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

DO YOU HAVE A LEASE TO SELL? For as little as $5 per week you can tell your proposition to over 45,000 oil men through The Journal's classified advertising pages. You'll be surprised how many are interested.

HAVE 100,000 ACRES of Ohio and West Virginia Oil and Gas Leases in Appalachin Basin Area for immediate sale in the Multa Million acre lease play scattered in and through major companies holdings, specializing in 50 to 60 thousand acre blocks. David Law, 716 Union Trust Building, Parkersburg, West Virginia.

TEN YEAR LEASES—5,000—15,000 acre Blocks—good play areas. Ohio-West Virginia Production. Box 393, Marietta, Ohio. Phone 373-6862.

WATER FLOOD PROSPECTS WANTED
Active Oklahoma independent desires to purchase good water flood prospects located anywhere in the Mid-Continent area. Box M-453, The Oil and Gas Journal, Tulsa, Oklahoma.

SOUTH TEXAS AND GULF COAST LEASES WANTED
Active independent desires South Texas and Gulf Coast close in oil and gas drilling prospects. Immediate action on submittal of full information. Box M-452, The Oil and Gas Journal, Tulsa, Oklahoma.

WYOMING, NATRONA County 240 acres Federal lease-Sec. 23, T 29N. R 83 Michael Fanakos, Box 73, Villa Grove, Illinois.

LEASE FOR SALE: 6 active wells. Good production. Warren County, Kentucky. Write Box M-462, The Oil and Gas Journal, Tulsa, Oklahoma.

PROSPECTIVE OIL LEASES: Am fee landowner over 2,000 acres near Pan American Petroleum Corporation No. 1 List, Sec. 23, Block 68, Township 1, T&P Survey, stratigraphic test, projected to 8,500 feet. anticlinal axis nearby, Hudspeth County, Texas, leases available Hudspeth, Crane, Terrell Counties, Texas. Write landowner: Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Santa Fe, New Mexico. Notice is hereby given that approximately 3424.11 acres of land in 18 parcels within the known geologic structure of certain fields in Pittsburg, Major, Woodward, Texas, Harper, Woods, Canadian, Kingfisher and Beckham counties, Oklahoma will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 2:00 p.m., MST, August 15, 1961, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Land Office at Santa Fe, New Mexico, Douglas E. Henriques, Manager.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that approximately 309.09 acres of land in four parcels within the known geologic structure of the Rock Creek field, Franklin County, Arkansas, will be offered for competitive oil and gas leasing through sealed bids to the qulaified bidder to the highest cash amount per acre at 1:00 P.M., E.S.T., August 2, 1961, when bids will be opened. Full details of the lease offering, and how and where to submit bids, may be obtained from the Manager, Eastern States Land Office, Bureau of Land Management, Washington 25, D. C. H. K. Scholl, Manager.

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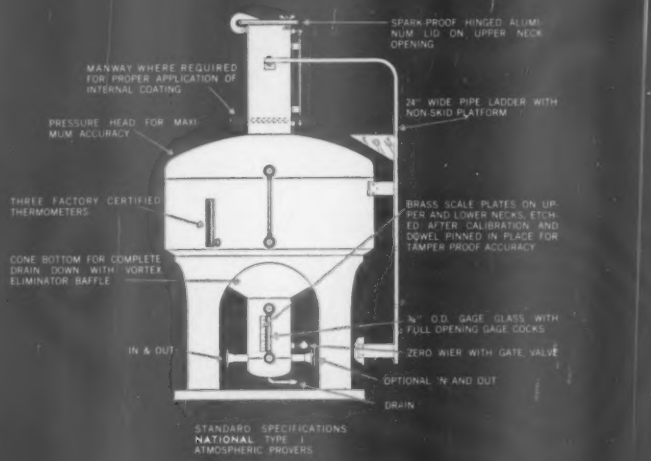
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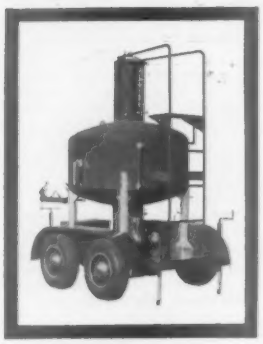

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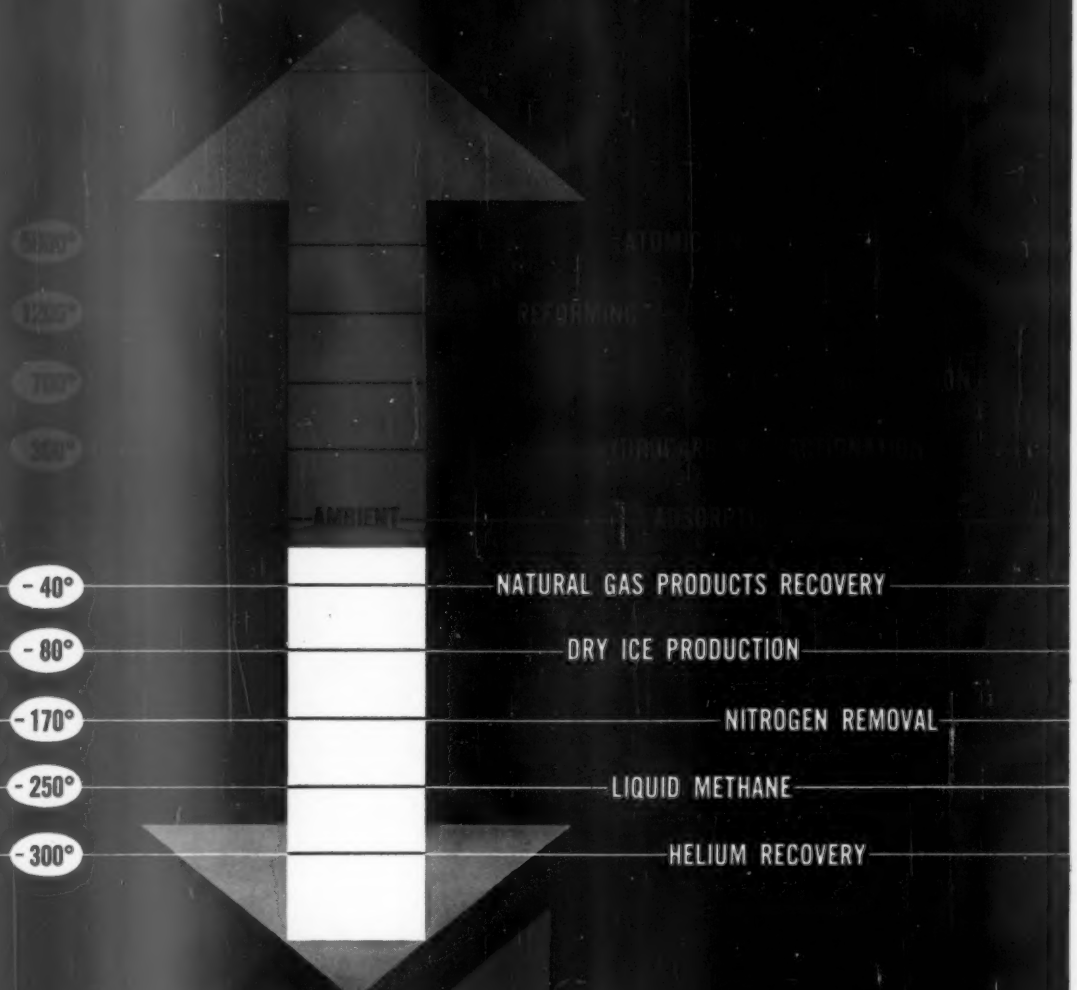

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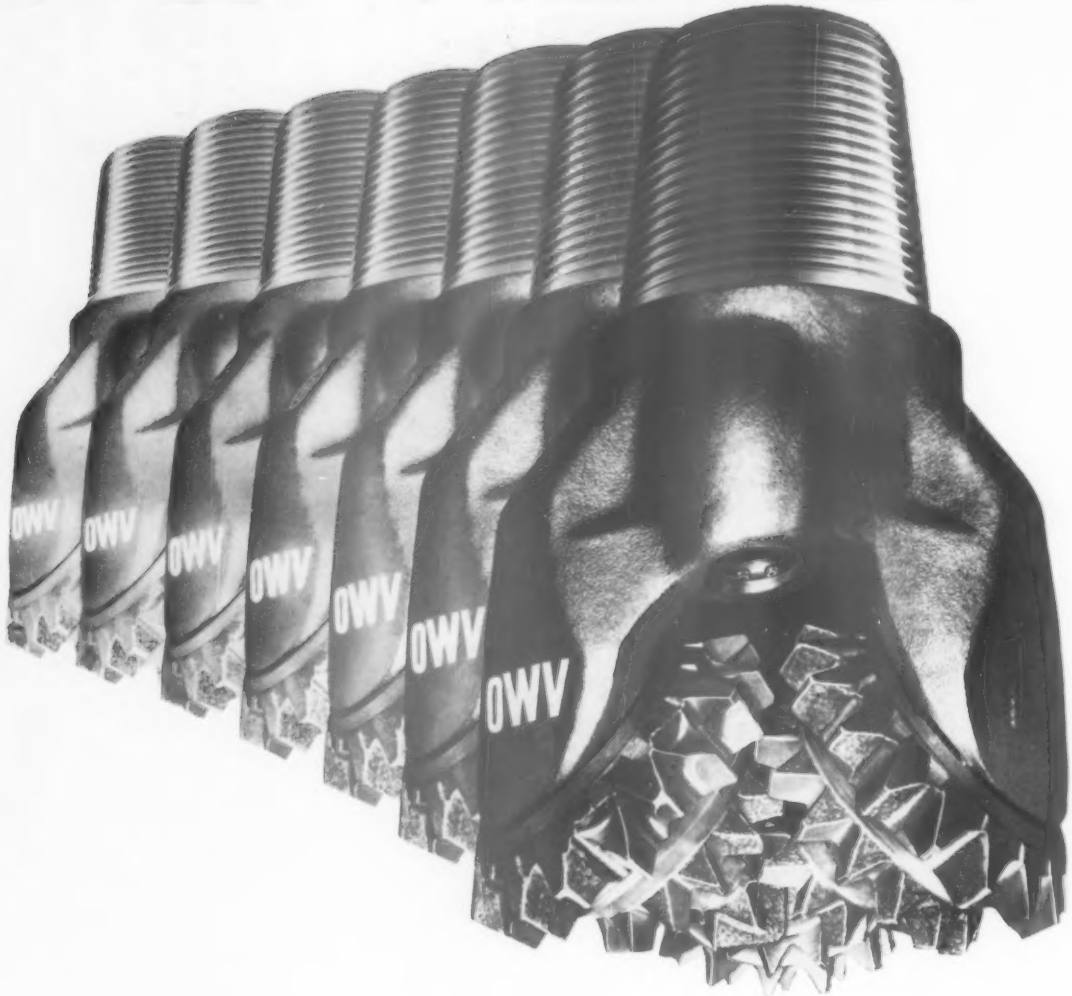

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